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JOURNEYS IN MONGOLIA.*

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Mongolia has not received much attention from Englishmen. Nor do I wonder. It has little or no charm for the tourist; no scenery, no sport. Mongol life is simple and not beautiful, and the few objects of interest are archæological relics, unattractive in form, and not easily accessible. For two centuries before the era of treaty relations with China, a sparse succession of Russian missions—ecclesiastical, commercial, and diplomatic—crossed the Gobi by one or other of the caravan routes from Kiakhta to Kalgan, and during the last forty years there has been a continuous if slender trickle of foreign travellers, mostly Russian, over the same routes; but they are the only tracks which can be considered beaten by Europeans. Elsewhere the important trade routes have been traversed by a number of Russian explorers and pioneers of commerce, but there is still a good deal of blank space on the map —blank space which hardly contains any secrets of moment.

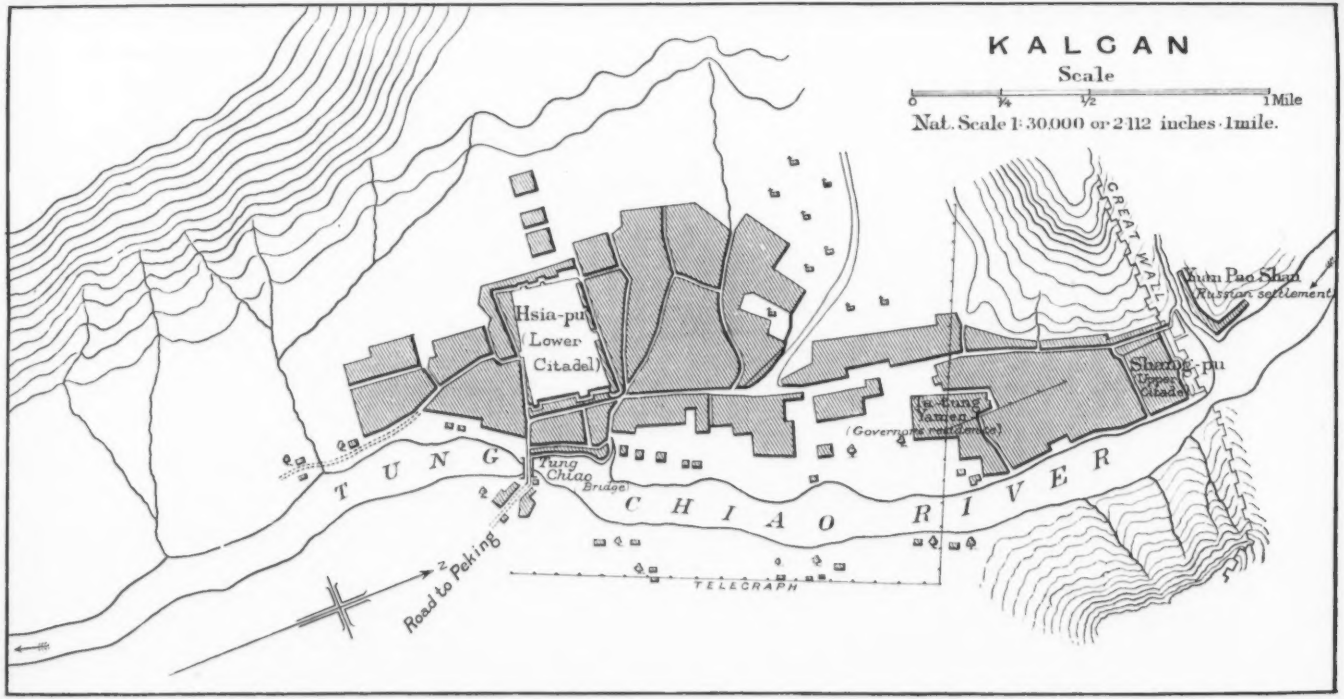
If you set aside the regular caravan routes, and the south-eastern border from Dolon Nor to Kwei-hua-cheng (the "Blue Town" of Huc), few English names appear in the list of Mongolian travellers, and few of those turned their attention to regions west of the Kiakhta-Kalgan line. The most notable English name is Ney Elias, and his route was from Kwei-hua-cheng to Sair-usu, Uliasutai, Kobdo, and the Russian frontier at Biisk. There is no record of an English traveller in the large space from the Kiakhta routes on the west to the Khingan mountains on the east. Besides the Jesuit father Gerbillon, whose journeys date back two centuries, and Dr. Franke, of the German

* Read at the Royal Geographical Society, June 8, 1903. Map, p. 600.

Consular Service, I know of none but Russians who have travelled in this space, and the number is small. The prominent names are Fritsche, Pozdnyéev, and Prjevalski, and the last went no further north than the Dalai Nor of Inner Mongolia. I was attracted to this region by a recommendation of Bretschneider, and in May, 1900, I found myself with sufficient time at my disposal to undertake a leisurely journey in East Mongolia. The outfit for this had been carefully arranged, and was the outcome of a year's preparation, but on my way north through Tientsin to Peking I was unfortunate or fortunate enough to drop into the middle of the Boxer outbreak, and I was forced by unlooked-for contingencies to postpone the expedition till the summer of 1902.

I may say here that I have journeyed on several occasions beyond the Great Wall in the region north of Peking; in 1893 a month's tour took me through Ku-pei-ku (Old North Pass) to Feng-ning Hsien and Jehol, the Simla of Kanghsi, who was the *roi soleil* of the Manchu dynasty; and in 1899 I spent a month in the Chahar country close by Kalgan. The starting-point of these excursions and of my journey of last year was always Peking, and as a preliminary step I cannot do better than commence at once on the shores of the great lake-sea of North China, the Gulf of Pechili, and direct attention shortly to the principal features of the terrestrial relief. There is the vast alluvial plain of Chi-li, larger than England, which stretches from the valley of the Yellow river northward, and is brought to an abrupt and striking termination by lines of mountains easily visible from Peking. On the sea-coast these mountains first attract notice near Shan-hai-kuan, well known as the east extremity of the Great Wall. Following them westward, they are seen to bend slightly south and again north until the valley of the Pei Ho is reached; here the plain, slightly rising—at Peking it is, according to Fritsche, 37·5 metres, or 120 feet, above sea-level—makes a deep irregular inroad on the domain of the hills, and it is here that we naturally look for the principal highways from lowland to plateau. Past Peking the mountains continue south-west and south, trimming the plain in the same bold fashion, but they do not there concern us. North-westward, the direction in which we are going, we file through them, and discover that they practically cease near Kalgan and Dolon Nor; beyond these points to north and west stretches a vast expanse where, amid much unevenness, no startling eminence is to be seen.

The contrast between the two regions thus separated by 100 miles or so of highlands is immense. The Chi-li plain, sown broad-cast with towns and villages, and so thickly that you are rarely a mile away from one, is as flat as a floor, and averages something very little above the surface of the sea; it is a great cornfield, and the swarming population lives on the products. The steppes and downs of Mongolia are 4000 feet above the sea-level at Dolon Nor, and at Angul Nor they are invariably undulating or spaced by low hills; there are hardly as many


KALGAN
Scale
0
1/4
1/2
1 Mile
Nat. Scale 1:30,000 or 2·112 inches·1 mile.
GREAT WALL
Yuan Pao Shan
(Russian settlement)
Hsia-pu
(Lower
Citadel)
Shang-pu
(Upper
Citadel)
Ya-mun
Yamen
(Governors residence)
TUNG
CHIAO
RIVER
Tung Chiao
Bridge
TELEGRAPH
Road to Peking

2 L 2

souls as villages in Chi-li to the square mile; and cultivation, except on the south border and on a limited portion of the Siberian frontier, is unknown. The intervening zone of mountains is seen to be a long incline, the frayed and crumpled rim of the Mongol upland. It has been only partially surveyed, though sufficiently reconnoitred to establish that the trend of the higher chains—Richthofen enumerates four in the part west of Peking—is nearly north-east and south-west, and that few of the peaks exceed the verge of the plateau in absolute height.

Peking lies in the extreme north of the Chi-li plain, within a score of miles of the south edge of these mountains. The new railway ends there, and in point of time it is still, in 1903, as far from territory inhabited by Mongols as London is from Moscow, yet it is much the most convenient and appropriate base for an expedition into Mongolia. A glance at the map shows the convenience; it is placed on the line of least natural obstruction, and the trade routes of Mongolia converge on it. And what more appropriate as a base for travel in Mongolia than Kublai's city, Khanbaligh or Cambalue, the "Great Court," whence a Mongol governed the mightiest empire of Asiatic history?

Peking to Kalgan.

In both 1899 and 1902 I set out from Peking in early summer, my immediate objective being Kalgan, which is the point on the Mongolian border nearest to Peking. My route passed through Kuan-shih, Nan-ku, Huai-lai, Chi-ming-yi, and Hsuan-hua. It is a highway of immemorial reminiscence, and figures largely in Chinese and Mongol annals. It has been described often, and I will merely refer for a moment to the celebrated archway at Chu-yung-kuan, in the Nan-ku defile. It is of white marble, was built in the Mongol period, in A.D. 1345, and the walls are covered with Buddhistic figures carved in relief and with inscriptions, all much defaced and chipped, chiefly by the tremendous traffic through the gate. These inscriptions, which were brought to the notice of European scholars forty years ago by Mr. A. Wylie, are in six languages. Five of these languages offered no difficulty — Sanscrit, Chinese, Tibetan, Mongol and Uigur — but the sixth was unknown, and although Mr. Wylie adopted the view of a Chinese author that it was Juchen (Neuchih, Nu-chen), the national script of the Chin or Gold dynasty who followed the Kitans as the dominant power in North China in the early part of the twelfth century, it was soon pointed out that the few known specimens of Juchen writing did not help this identification. It is only within the last few years that a Fellow of our Society, a former physician to the British Legation at Peking, Dr. S. W. Bushell, established beyond doubt that the unknown inscription is really in a Tangut writing, of which few specimens are extant.

There are, according to Chinese official records, five great ancient

post-roads from North China into Mongolia. Beginning from the east, they cross the Great Wall at Hsi-feng-ku (Joy Peak Pass), Ku-Pei-ku (Old North Pass), Tu-shih-ku (Lone Rock Pass), and Chang-chia-ku (Chang Family Pass) in Chi-li, and at Sha-hu-ku (Kill Tiger Pass) in Shansi. The town of Chang-chia-ku, better known to Europeans as Kalgan, a Russianized form of the Mongol name Khalga (the Gate), lies at the foot of the last ascent to the plateau, which here makes its nearest approach to Peking and the sea. It is a convenient market for a large part of south-east Mongolia, but it is pre-eminently a transport depôt, and owes its importance to the caravan trade with Urga, Uliasutai, and Siberia. But the tea transport to Siberia, which in the past has been the great feature of Kalgan trade, is declining rapidly as a consequence of the competition of the Manchurian railway, assisted by the new duties on caravan tea which are levied at Kiakhta by the Russian Ministry of Finance. Of the frontier trade routes, Kalgan is inferior only to Kwei-hua-cheng or Kuku-hota (Blue Town). There are three quarters: two south of the Great Wall, called Shang-pu and Hsia-pu (Upper and Lower Citadel), of which the nuclei are two brick-walled fortresses of some antiquity; and Yuan-pao-shan (Ingot Hill), so named from its fancied resemblance to a shoe of sycee, a suburb outside the wall to the north-west which has been the abode of Russian tea agents for the past forty years. In 1688 Gerbillon dined with a rich merchant in Hsia-pu, of which he says "on y fait un gros commerce," and no doubt for centuries before that Mongols found their way to Kalgan to barter horses and cattle for Chinese utensils and finery.

To the Kalgan gap the waters draining from some 2000 square miles of the Mongol escarpment converge, and the quantities of eroded rocks and boulders cumbering the depths of the valley and the bed of the Kalgan river (the local name is *Tung-chiao-Ho*, "Through Bridge River") suggest torrents of magnitude. Two ravines descend from the heights and join at the gap. The larger, from the north-east, is the post route, and is called the Chagan Tologai (White Head Pass); the north-west ravine, the Barun Daba (West Pass), is the caravan road, shorter, narrow, and more precipitous. Smaller ravines and depressions run into these two, and they in turn have their branches, and so on until the water-shed is reached in minute folds and cuttings. The deciding rim probably averages 4800 feet above the sea, and Kalgan is 2700 feet, but the distance from the rim in places is scarcely over 12 miles, and when a monsoon thunderstorm bursts over this ramification of ravines the floods descend too rapidly for the capacity of the exit, the waters are banked up at the gap, and Kalgan barricades against inundation. What happens at Kalgan occurs along the valleys of the other rivers of Outer Chi-li—Pai-Ho and Chao-Ho (upper waters of the Pei-Ho) and Lan-Ho—none of which are navigable beyond the Great Wall. I have only seen ferry boats on any of them. But there are so many places where the

passage is restricted by narrow valleys or defiles, that a smart shower of rain alters their character at once, and floods are a common scourge.

The Chahar Country.

Mule-carts brought my baggage from Peking to Kalgan, and over the rim of the plateau to a Mongol encampment at Khara-usu. Here I found a caravan of camels, camel-cart, and ponies, which Mr. A. Larsen, a Swedish missionary of Kalgan, who travelled with me as far as the Kerulon, had very kindly purchased for me beforehand, and with Mr. Larsen's help it only took me a few days to make the final preparations. Close by Khara-usu is Angul Nor, the largest sheet of water in the Chahar country. In 1899 I launched a duplex Berthon on this lake, the first boat seen in this part of Mongolia, and spent some days sounding it and collecting botanical and natural history specimens in the neighbourhood. Last year Chabeh Singh, a sub-surveyor, whose services were lent to me by the Indian Intelligence Department, made a sketch of it, which places its outlines on the map accurately for the first time. It is heart-shaped; the greatest length is 7 miles, and the area about 28 square miles. I rowed across it from north to south, and found no greater depth than 4½ feet; Mr. Larsen took a line east and west, and had an exactly similar experience. The average depth cannot be much over 2 feet. The water tastes strongly of soda, is charged with organic impurities, and quite unpotable; but the cattle and ponies seem to thrive on it, and the camels love it. A sample of this water which I sent to the health officer of Shanghai, Dr. Arthur Stanley, was pronounced by him to be "highly poisonous as a beverage," and destructive of "animal and most vegetable life." I spent some time in a fruitless search for fish, and finally came to the conclusion that there are none in the lake. There was nothing living in it except a few water-fleas, and patches of a species of water-grass. The bottom throughout was blue mud or ooze, which often stank. Swans—I counted over eighty—and sheldrakes were breeding, and the Mongols said that they came every year.

The lake is merely a local area of depression dammed on the west and south by low hills, and fed by a few wet-weather streams from those hills, and by the Khara-usu river, which makes a circular sweep from the east, drains a considerable area, and enters the lake at its northernmost point. The Khara-usu river in July, 1899, was a mere trickle of running water; in June, 1902, it was a series of shallow pools. After heavy rains it swells to a width of 10 yards, and is 2 or 3 feet deep. Chabeh Singh's map represents the normal size of the lake. The nature of the east shore shows that a large expansion takes place in rainy seasons, and the Mongols told me that in droughts the lake is smaller than I have seen it.

There are between Kalgan and Angul Nor the remains of two walled

cities, the first of which, Khara-balgas (Black City), dates probably from the Liao dynasty. In the Mongol period it received the name of Hsing-ho-cheng, by which it is known to Chinese at the present day. Till recently it was, like all these ancient cities of Mongolia, uninhabited—in 1872 Dr. Bushell remarked that it was "completely deserted and overgrown with grass"—but about fifteen years ago Chinese farmers started cultivating the space enclosed by the walls, and in 1899 there was a flourishing Chinese temple and a Chinese village of forty or fifty houses occupying the centre of it. A fair held yearly, towards the end of July, is one of the events of the Mongol border. The earth-walls, long flattened by the elements into mounds of gentle outline and grass-

ON THE ROAD FROM PEKING TO NANKU.

covered, face the points of the compass, and are half a mile square. They must have been 30 feet high originally, and there are traces of a 40-foot ditch running outside them, the water for which came from the Borochei rivulet close by. The north-west angle of the wall is surmounted by a small Chinese shrine, built up against an ancient Mongol *obo*, or prayer-cairn, and during the fair of July, 1899, I saw hundreds of Chinese worship at the shrine, and but few Mongols pay any mark of respect to the *obo*.

Some 8 miles north-west of Khara-balgas is Chagan-balgas (White City), which has been identified with Marco Polo's Chagan Nor. It is smaller than Khara-balgas—the space enclosed is 600 yards square—but the corners of the walls and the gates, of which there appear to

have been four, were faced with brick. Towards the centre there was in 1899 a large oblong heap composed of broken bricks and building rubbish, amongst which I noticed pieces of the green and yellow tiles distinctive of imperial buildings. There were traces of an exterior wall some distance outside the city. No doubt Chagan-balgas was one of Kublai's hunting or summer residences; Hyacinthe thought that it must be his Chung-tu (Mid Capital). I saw nothing of the "circular place enclosed by unhewn stones," mentioned by Timkovski, who visited Chagan-balgas in 1820. Some twenty Chinese families live under the lee of the north wall, and they have dug the bricks for their houses out of the corners and gateways. Three-fourths of the interior space is under cultivation. This is quite recent; the Chinese told me that they had come four or five years previously, but Mr. Larsen was certain that in 1895 it was uninhabited and uncultivated. I saw later on, in the keeping of the Roman Catholic Mission near Hsing-ho-ch'eng, a dragon's head in marble, and one or two other relics of Chagan-balgas, but nothing bearing an inscription.

The Great Wall, which we passed at Kalgan, has long ceased to fulfil the last of its functions, that of a political boundary. The expression Kou-wai (Beyond the Passes) applied to the region outside the wall can no longer be taken as a synonym for Mongolia. As the pressure of population in Shan-si and Chi-li increased, swarms of Chinese spread beyond it, ousting the Mongols, and gradually colonizing all the mountains which form the broad staircase to the high plains inland. Already the line of advance encroaches seriously on the plains. I had an opportunity of judging the speed of this invasion. In 1899 the Chinese settlers had reached a mile or so beyond Chagan-balgas; in 1902 I found them ploughing the virgin turf near Dabasun Nor, a pool which is 10 miles further north. All these Chinese settlements, which extend along the edge of the plateau from the Yellow river to the Khingan mountains, are withheld from Mongol jurisdiction. They are governed by special prefects, three of whom are stationed at Kalgan, Tu-shih-ku, and Dolon Nor.

On June 16, 1902, we set out from Khara-usu (Black Water), and took a north-easterly course through a Khalha *hoshun* of the Inner Mongols and the territory of two Chahar banners and the Imperial Horse Pastures, to the ancient summer seat of the Yüan emperors, Shang-tu. We made a detour to avoid the direct route to Dolon Nor, which we wished to touch at eventually to renew our stock of flour and millet, and the greater part of our route was new. Till we reached the Shang-tu Gol there was no running water. Pools and lakelets, every one of which has a name—Dabasun Nor (Salt Lake), Hatate Nor (Stony Lake), Chamin Nor (Way Lake), Hagiye Nor—abounded; all permanent or semi-permanent sheets of water, no matter what the size, are called *nor* alike by the Mongols. There were occasional stretches of steppe which

rolled into the horizon, but as a rule our view was bounded by low green hills of soft outlines. Plain and hill were treeless. I saw only two or three stunted elms in sheltered clefts. Except in the Shang-tu valley the Mongol tents were sparse, although the pasture was everywhere excellent, and the cattle and horses in thriving condition. In a day's march covering a view of 80 or 100 square miles, I could count fifty or sixty tents, say forty families, or something under two persons to the square mile. From Khara-usu to the Shang-tu valley the only permanent buildings were monasteries—Khalha Sume, Khalha Hoshoin Sume, Bitirye Sume, and Ole Sume. At Mo-kherim (Bad Wall) we passed close to an earthen rampart, grass-grown, which I was told extended westward past the Kalgan-Urga route. From its antique appearance I judged it to be a Chinese defence of the pre-Mongol period.

On June 24 we camped in the south-east angle of a deserted walled town, which is marked on Waeber's map as "Kurtu-Balgasu." The Mongols living near call it Balgas simply, and know nothing of Kurtu Balgas; the Chinese name is Hsin-liang-cheng. The walls appear to have been constructed of earth only, and are now melted into a succession of grass mounds. They enclose a square of 1300 yards, and face 10° west of the magnetic north. Near the centre of the enclosure there are the remains of substantial buildings, broken bricks and tiles, and a few weather-worn remnants of cut stone, but the bulk of the interior is covered with mole-hills and green sward, which bear no traces of former habitations. Wang Yun, a Chinese traveller quoted by Dr. Bushell, who went in the suite of Kublai to Shang-tu about A.D. 1260, mentions "the new city of Huan-chou" as being 45 li from Shang-tu. The odometer attached to my camel-cart made the distance 12¾ miles, and the local Mongols called it 40 li. There is no other Balgas which so clearly represents Wang Yun's "Huan-chou."

Dondo-hota (Middle Town), a collection of thirty Mongol families clustered around a large Chinese dwelling, lies a mile to the south of Hsin-liang-cheng. I noticed here, and elsewhere in the Shang-tu valley, that many Mongol tents were protected from north winds by fences of boughs roughly plastered with mud.

I spent the afternoon of June 25 inspecting the remains of Shang-tu (Upper Capital), or, as the Mongols now call it, Cho Naiman Sume (the Hundred and Eight Temples). In the diary of his 'Troisième Voyage en Tartarie,' Gerbillon, under the date of May 19, 1691, mentions, "la ville de Chantou où les Empereurs de la famille des Yuens tenoient leur cour durant l'été; on en voit encore les restes"; but the first description of these ruins was given in a paper by Dr. Bushell, and read before this Society in 1874. I have nothing of importance to add to Dr. Bushell's description. Since his visit some vandal lamas have collected most of the interesting marbles and stone-work and made an *obo* of them. The archway of one of the main gates, under which

Kublai himself must have passed frequently, is still standing, but I saw signs that the ruins were being drawn upon for building materials, and as soon as the line of Chinese immigration invades this part of the Shang-tu valley, the disappearance of these interesting relics will be a matter of very few years.

From Shang-tu to Dolon Nor is a short day's journey, under 20 miles, south-east over a succession of low hills. Dolon Nor (Seven Lakes), called Lama-miao (Lama Temple) by the Chinese, is the third of the great trade centres in South-East Mongolia. It was the scene of the submission of the Khalha princes to the Emperor Kang-hsi in 1691, a ceremony which Gerbillon, an eye-witness, describes in minute detail. My camp was pitched to the north-west of the town, which is purely Chinese and in no way attractive, on some rising ground between two extensive lama monasteries. One of these, Hui-tsung Ssŭ (Temple of the Gathering of the Clans), or, as the Mongols call it, Shara Sume (Yellow Temple), was erected in commemoration of the ceremony mentioned above by contributions from the Mongol princes who assembled to do homage; and soon after its foundation, Chinese traders were allowed to establish themselves a short distance off, across the Urstung Gol (a branch of the Shang-tu river), and commence the Mai-mai-chen, or "trade borough," which can now boast of 30,000 inhabitants. The other monastery, Shan-yin Ssu (Good Cause Temple), or Kuku Sume (Blue Temple), was built with a donation of 100,000 ounces of silver from the Emperor Yung-cheng, Kanghsi's son, and contains a stone memorial tablet dating from the ninth year of his reign (1732).

My first march from Dolon Nor was directed to the ruins called Chagan-hota (White Town). They are just under 7 miles by road to the north of the two monasteries. The outside walls, of what was probably an imperial residence of Kublai's of the same character as the Chagan-Balgas near Angul Nor, enclose a space 350 yards square. They are still standing in parts; the north-west angle is intact, and shows that the walls must have been 20 feet high. They were composed of two facings of rubble packed with earth, and they tapered from a breadth of 15 feet at the base to 5 or 6 feet at the top. The rubble is of smallish flat stones, laid in lime-mortar. There were evidently three gates—on the east, west, and south. A hundred yards north-east of the main enclosure there are traces of a smaller one, 80 yards by 70. There is one large mound near the centre, four smaller ones north of it, and two—evidently remains of pavilions—at equal distances south-east and south-west of it. No one lives in Chagan-hota, and my Mongol followers did not relish the prospect of camping inside it as we did for two nights. The Mongols believe that all these old palaces and cities are haunted, and that the spirits are prone to bring misfortune on intruders. It seems to be an equal article of belief that gold and valuables are to be found in all ruins, but delving is tabooed, because

it would infallibly involve the neighbourhood in disaster—murrain, drought, or plague.

North of the Shang-tu Gol we entered a region of sand hillocks, which continued as far as the south shore of Dalai Nor. According to Prjevalski, the local designation of this region is Guchin Gurben (Thirty-three), but I was unable to obtain any confirmation of the name. The Chinese call it popularly the Sha-wo-tzu (Sand Nests). There is little or no population until Shibe Sume is passed. During

AN OBO (KERULON VALLEY).

more than one twenty-four hours we did not see a soul, and this was attributed by Mongols and Chinese alike to the prevalence of robbers, who find it perfectly easy to escape with stolen cattle or horses in this labyrinth of monticules. There was a bewildering choice of cart-tracks and paths made by Chinese in search of the brushwood and sparse timber growing on the north slopes of the hillocks (few of them were over 100 feet high), and we strayed daily. A little north of Hsi-pei-miao (North-West Temple) or Shibe Sume, we passed from the

Chahar country (Gul-kuku, or Plain Blue banner) into the Geshikten *hoshun* of the Inner Mongols.

Dalai Nor Region.

The only point in the Sha-wo-tzu which I could connect with previous travellers was the Shaborte Sume (Marsh Monastery) mentioned by Prjevalski. My route to the south-west angle of Dalai Nor took me almost due north, through Chagan Hota, Mohor Bulak (Blind Spring), Shaborte Sume, Shibe Sume, Barta, Shorga, and Hureko. Hureko (pronounced by Chinese Ko-li-kao, or K'o-li-keng) is the most outlying of the permanent Chinese trading settlements in this quarter. I found three small firms, who barter salt and flour for hides, wool, and cattle, and a Chinese population of forty, living in stockaded houses. They were harassed by roving bands of their countrymen, mostly fugitives from justice, who make a bare living by fishing the Dalai Nor in summer. Some of these vagabonds were deserters from the armies who fought around Peking in 1900.

Salt is obtained from many pools and lakes throughout South-East Mongolia, but there is one great salt lake (Dabasun Nor) a week's journey north-west from Dalai Nor, which is the most productive. I constantly came across well-beaten cart-roads (*yen-lu*, "salt roads") leading to this lake, and interminable trains of rude ox-carts were occasionally sighted crawling to Dolon Nor with loads of crude salt. The wheat and oat flour used in the Mongol trade hereabouts comes from Chin-peng, a thriving Chinese town situated in a farming district some 25 or 30 miles south-east of Dalai Nor, which, originally a camp of gold-miners clustered around a Geshikten monastery, has grown up in the last half-century, and must now possess ten or twelve thousand inhabitants. The Mongol name for Chin-peng (Gold Tent) is Piro Hota.

We camped for a couple of days on the shore of Dalai Nor, just beyond the sandhills of Geshikten, and within sight of a prominent Buddhist *stupa*, known as the Chagan Soberga (White Pagoda). We were now on the border of the Abagha Hoshun. Three rivulets discharged into the south-west corner of the lake—one close to Hureko, called the Hûreko Gol, another passed on the way to our camp, and the Hore Gol, which came from the White Pagoda to a point 300 yards north of our camp. Dalai Nor is a considerable sheet, 16 miles from north-east to south-west, and about 10 from east to west. The water has a soda flavour, but it is greenish, clear, and—in the form of tea—drinkable. There are no boats on the lake, and I was unable to examine and sound it as I had hoped. The whole of the south-west shore shelves gradually, and, by all accounts, the lake is generally shallow, though the Chinese fishermen (who in these matters are not reliable informants) were positive that it was deep in the centre. The same informants were enthusiastic on the abundance of fish of two or three kinds (I myself saw only one

species of carp), but lamented that religious scruples of the Abagha prince interfered with the prosecution of a lucrative fishery. The prince, as a fervent Buddhist, objected to the lives of the big fish being taken, and in permitting the Chinese to fish, made it a preliminary condition that all the large ones caught should be returned at once to the lake. The bottom was sandy. I saw some reeds on the south shore, which was hilly, and there were many water-birds—geese, ducks of two or three species, sheldrakes, teal, plover, lapwing, redshanks, snippets, gulls, and terns. I noticed also a fishing-eagle, kites (*Milvus melanotis*), buzzards (*Buteo desertorum*), and peregrines, chats (*S. œnanthe*), larks (*Melanocorypha mongolica*), pipits, ravens, magpies, sparrows, swallows, and martins.

Gerbillon touched at Dalai Nor in 1689 in his remarkable journey with Father Pereira and the Chinese Ambassadors, who were sent to Nertchinsk to conclude the first treaty with Russia, and he mentioned the ruins of a "pagoda" and a marble monument with Chinese inscription, of which he was unable to take a copy. Prjevalski, who circled Dalai Nor in 1871, did not mention ruins, and I concluded that they had disappeared in the course of the two intervening centuries. I was agreeably surprised to hear from our Mongols that there was a *balgas* close by our camp, and I promptly inspected it. It lies 1½ miles from the south-west angle of the lake under the *stupa* above mentioned. The outer walls are a rectangle 900 yards from north to south, and 800 from east to west, and were originally some 20 feet high and 30 broad at the base. They are of sandy loam, and are now a succession of longitudinal mounds, which, from a quarter of a mile off, might be mistaken for ordinary low sand-dunes, and I can easily understand Prjevalski's omission to notice them. The walls face the points of the compass very nearly. Within there is no general spread of ruins as in Shang-tu, and I formed the opinion at once that the original contents were a few important buildings or a royal residence. In the middle of the northern half there is a series of ruins of a palace or temple. Of one large hall, which was 80 feet square, I counted forty-eight diabase plinths, each 4 feet square, still *in situ* in two rows; and in rear of it there is a rectangle 55 feet by 45, formed of fifteen worked plinths of white marble, much damaged, on which no doubt rested the pillars of the most important structure. In front of these ruins to the south are two black stone (diabase) lions, and more to the south still are the almost unrecognizable trunks of two massive stone tortoises, near which are lying in the grass two mutilated monuments of white marble, with Chinese inscriptions of the Yuan period. In the north-west angle there are two raised mounds, with plinth stones scattered about, and the remains of what must have been a special raised enclosure of considerable dimensions; inside it there is the solitary tree of this deserted city, an aged elm, peopled by noisy starlings and sparrows. There are traces of three gates in the

east, west, and south walls, and inside the west gate remains of walls of inferior buildings can be traced. In the south-east angle I noticed two small lions hewed out of black volcanic stone, and here and there in the east half of the city there are ruins of smaller edifices. No portion of stone wall remains standing; the place must have been razed and the monuments overthrown and defaced. I saw pieces of the royal blue tiles which I found in Shang-tu and in Kurtu Balgas (Hsin-liang-cheng).

It was evident that Gerbillon's description did not fit these ruins, and I was under the pleasing impression that I was the first European to notice them, until I reached Irkutsk, in November last. There I bought M. Pozdnyéev's new work on Mongolia, and from the second volume I learnt that in 1893 he had seen the marble monument answering to Gerbillon's description, and also the ruins I have mentioned above. M. Pozdnyéev quotes from a well-known Chinese book, 'Meng-ku Yu Mu Chi' (Records of the Mongol Nomads), a passage which clearly refers to this place. In A.D. 1271 Kublai authorized the building of this city, and it was named Ying-ch'ang Fu. Thither the last of the Mongol emperors, Toghon Timur, fled before the conquering Mings, and there he died in 1368. These old ruins were then the last retreat of the Mongol Court south of the Gobi. The local Mongols called them "Hota" (town) simply, know nothing of their history, and were not much interested when I told them that the Chinese dynastic title of Kublai occurred on one of the marble monuments.

We followed the whole length of the west shore of Dalai Nor. For a time our route passed over rolling hills close by two inferior monasteries, Abagha Sume and Dalai Sume, and then a level plain commenced, dotted with clumps of dust-covered *deris* (*Lasiagrostis splendens*) near the lake, but northward we trod on lovely sward, sprinkled with magenta clover, yellow vetches, and tall thistles. The plain rose into gentle heights on the north horizon. Evidently the lake had extended over it at no distant period. There was a small *inselberg* east of us in the middle of the plain, much water-weathered, and the edges of the low hills to the north-east were water-worn. On the slopes of these hills I counted a herd of five hundred *huang yang* (*Antilope gutturosa*), the largest seen by me in Mongolia. The east shore of the lake, which was easily visible from many eminences, shimmered in the sunlight—the "saline plains" of Prjevalski.

Not far from the north shore we passed a low earth-mound, scarcely noticeable, running east and west, with small hummocks at regular intervals marking the sites of towers or bastions. The appearance of this rampart, known locally as the Mo-kherim (Bad Wall), suggested to me a greater antiquity than the walls of Ying-ch'ang Fu, and no doubt it is an ancient Chin or Liao barrier. I saw it continue eastward for 7 or 8 miles, and pass out of sight over the hills. The Mongols did not know where it ended, either eastward or westward, and from their

remarks I was inclined to believe that it was the same wall which we passed at Mo-kherim in Chaharia, and which further west again is found crossing the Kalgan-Kiakhta caravan routes.

East Hochid and Uchimuchin.

Three days' travel north-north-east took us out of the Abagha district into Jun Hochid (East Banner of the Hochids). The Shilin Gol, a clear stream with a bed 20 yards wide where we passed it, waters the country immediately to the north of the Dalai basin. Most of the river-bed was dry, and the water trickled through sandy reaches, but

VIEW OF A STREET IN URGA.

here and there it gathered into a rapid current over a foot deep. It flows westward, into a lake, the Mongols said. Near Lama Sume there is a nameless *balgas*, a quarter of a mile square. I observed no trace of stone or brick buildings, and the line of low mounds marking the walls is overgrown with *deris*. In the Lama Sume valley I saw wild rhubarb for the first time, and a little further north I found a band of Chinese from Chin-peng collecting liquorice, which is a common plant on the lower hills. All the Abagha population was clustered around Dalai Nor and in the Shilin Gol valley. I counted fifty or sixty tents about the north shore of the lake, and saw at least thirty in 3 miles of the Shilin Gol, the river pastures being particularly green and abundant; elsewhere we rarely saw a traveller, much less a tent.

Want of water in the south part of Jun Hochid led us to take a more easterly curve through Haliutai, a lone spring bubbling from the rocks in a narrow gulch, to the upper valleys of the Chirin Gol. This is a rivulet of excellent water, formed by two streams, which flow from the Khingan mountains in a north-westerly sweep through the greater part of Jun Hochid. We followed it for two days, past four temples—Tatir Sume, Lamahai Sume, Wangin Sume (Prince's Temple), and Khaton Sume (Lady's Temple). The volume of water decreased—at Khaton Sume it was the tiniest of brooks—and, according to the Mongols, the Chirin Gol disappears in the sands to the north-west of our route.

Near Wangin Sume we halted for a night, at the summer encampment of the Prince of Jun Hochid. It was typical, and a description may be of interest. The encampment faced the south-east, the usual orientation of Mongol tents (I found by experience that it was much the best for all weathers). In front there was planted a 20-feet pole, coloured red, with a turned top, gilt; a few paces in rear of this were two similar poles to right and left, bearing a line of pink and white prayer-pennons; and 15 yards behind was pitched the first tent. It was of the finest new dull white felt, the circular top covering was embroidered and stitched, and it was surmounted by a gilt knob of turned wood only seen on the abodes of chiefs of banners. The old prince had died a few months before, and the son, an intelligent-looking youth of eighteen, kept this chief tent closed during the period of mourning and pending his investiture by the Court of Peking: in any case, it would be used only on occasions of much ceremony. Close behind it there were two tents in line, one large and new-looking, and these were also untenanted in consequence of mourning. Further in the rear in one row were five tents, in which the young prince and his family were living, and behind these again were three tents for servitors and dependents. Ponies were tethered and picketed on the left front, and there was a constant passage of men and women, mounted and on foot, from the living-tents to the large droves and herds which were cropping the short grass of the steppe, and to the Lamahai and Prince's Temples. I called on the young prince (the first foreigner he had seen), and was ushered by him into one of the five tents evidently set apart for visits. It was carpeted with felts, which were hemmed and stitched, and over them were laid square wool rugs, on which we sat. Around the wall of the tent were red varnished boxes, glaringly new, with large brass hasps and Chinese padlocks, and an iron brazier with sheet-iron top, on which I noticed the fag-end of a European candle, stood in the centre. The usual milk tea, a flavourless beverage of doubtful purity and only palatable in stages of extreme thirst, was served, and a plateful of a variety of cheeses, which looked as if they had often done duty on similiar occasions, was offered to me. I got an impression that the young prince was not affluent. His suite was poorly dressed—some

were ragged—and the tent bag and baggage was hardly worth £20. With the exception of four, all the princes and *jassaks* of the forty-nine banners of the Inner Mongols are descendants of Jinghis or his brothers, and this young Hochid prince (according to the *Ta Ch'ing Hui Tien*, 'Institutes of the Manchu Dynasty') is of the family of Torobolod, or Turubolod (*Sin*, *T'u-lu-po-lo-t'e*), who was sixteenth in descent from Jinghis himself.

A guide sent to us by the Hochid prince led us from Khaton Sume and the Chirin Gol on a straight course to the Khalha river and Khailar. To Balbur Nor we passed over a belt of sand hillocks similar to those of Geshikten, by swampy pools edged with sedges and rushes and swarming with mosquitoes, and through moist troughs studded with small elms and dwarf willows. Balbur Sume, a large temple of seven hundred lamas and a *gegen* (minor lamaistic incarnation), lies north-east of the lake, and here I noticed three well-worn caravan tracks leading from Manchuria to the middle course of the Kerulon. In the morning of July 15 we entered the territory of Ikhe Uchimuchin (Great Uchimuchin) under the leadership of a delightful old noble (*taichi*); on July 21 we reached Baga (Little) Uchimuchin; and on July 23, within three marches of the Khalha Gol the boundary line of Inner Mongolia was crossed, and we entered Khalha territory. Uchimuchin resembles the Chahar country, but the plains dividing the low, rounded hills are sandy, arid, or nitrous, in parts almost desert. For two or three days the want of pasture gave me some anxiety. The season was exceptionally dry, I was told, and the Mongols in some places were oppressed by the severity of the drought, which had killed large numbers of sheep. Uchimuchin is famous for ambling ponies, and certainly the breed was noticeably larger and finer than in Hochid, Abagha, Geshikten, and the Chahar country, but it is much exploited for the horse-markets of Manchuria (Ku-liehrh appeared to be the principal of these), and prices of good-looking animals were absurdly high. In Uchimuchin primitive carts of wood, which came all the way from the Khalha river, were in general use. A slender ring of cast-iron bushing inserted in the nave of the axle to work on is the only bit of metal used in the construction of these vehicles. Every *ail*, every tent had its carts; special water-carts, travelling carts roofed in with felt, and open carts for collecting *argol* and general purposes. Oxen were the usual draught animals, and the drivers in short excursions were invariably women.

I was told that woman holds a very inferior position in Mongolia, but I could not satisfy myself that this was so. The life she leads is inferior in Mongol estimation: milking, cooking, needlework, felt-making, are less agreeable occupations than the eternal gadding about on horseback, herding or visiting, in which the men pass their time. There is little scope for the display of feminine qualities, nor does the nomadic life foster these. There is nothing radiant about the Mongol

woman; with rare exceptions, she is withered and slattern, or young and slattern. Not even the daughters of princes can be said to "exist beautifully." No doubt the legal position of the wife in a family is an inferior one, at any rate so long as her mother-in-law is alive, but her actual place and influence depend on herself. A European cannot see much of the country without noticing the great freedom of intercourse between the sexes. The movements and actions of the women are, from the character of the life, completely untrammelled by the conventions to which we are accustomed. Women and girls making journeys on horseback or in carts, alone or in the company of men not their kinsmen, were to be met with commonly; our tents were visited by merry wives and maids eager to inspect the stranger's belongings, and they sat down as a matter of course in the circle of our Mongol henchmen and were in no way preoccupied by their own innocence. Husbands and fathers are constantly absent from their tents, sometimes for long periods, leaving the wives and daughters to look after themselves.

Marriage has no religious significance. It is a civil contract, whose binding force is the mere will of the parties. The husband or the wife seems to be at liberty to dissolve it for any reason that appears good to him or her, and there is no restriction on the re-marriage of either. Monogamy is the ideal basis of the family, such as this is in Mongolia; but in practice it is not allowed to interfere with polygamous experiments when the means to indulge in these are not wanting. Glaring obliquity in these matters is held in check by the fear of exciting interference from the wife's relations, and then a woman divorced takes her dowry and personal property with her. But there is little or no moral censure of concubinage. I once came across a Mongol lady with two husbands (she was the best man of the three), and though the *ménage* was considered unusual, there was no social condemnation.

Near Burte Nor, which is in Baga Uchimuchin but close to the Khalha border, we joined the main caravan road between Khailar and Dolon Nor. The traffic was inconsiderable, but striking after the loneliness of the previous three weeks: two small Mongol trains of ox-carts bearing timber to Ikhe Uchimuchin from the Khalha Gol, and a large caravan (fifty carts) belonging to Chinese traders of Khailar, who were transporting the season's collection of hides, sheep-skins, and poles to Dolon Nor. Khailar being a station on the Manchurian line, I asked these men why they did not use the railway; they complained of the cost of carriage, which would swamp all their profits, but I gathered that their real objection was the difficulty of changing long-established habits of business.

Khalha River.

On Saturday, July 26, we pitched camp on the Khalha river, near a prominent bluff of limestone named Krei Ul, which marks the boundary between two Khalha banners of the Tsetsen Khanate. Here the river emerges from the hills and splits into two channels and some back-water creeks. The bed is gravel and sand, and the water soft and pure, and running in places to 4 or 5 feet of depth. At the ford in front of our camp it was deep enough (2 feet) to cover the axles of

THE BOGDO (LAMA POPE OF MONGOLIA).

the ox-carts, and from the way the cattle and camels crossed it at will to pasture on either bank I gathered that it was not difficult to find a fording-place. From the top of Krei Ul I saw that the river wound north-westward between sandhills and bluffs, its course marked by a narrow *bourgas* (thicket) of willow, hawthorn, elm, currant, etc.; that the river basin, as distinct from the unwatered grey-green uplands, averaged under 3 miles broad; that this basin was moist, emerald

meadow, interspersed with marshes and pools; and that it was evidently subject to inundation during strong summer freshets. It was the most populous part of Mongolia which I had seen up to then. I counted two hundred tents in a day's march, nearly all on the north side of the river; the flocks and herds were continuous; and the tents were nearly all new and good. Eastward, in the direction where the celebrated Soyelki Shan is marked on the Chinese maps (I know of no European who has visited this mountain), I noticed hills of no considerable height—none more than 800 or 1000 feet above the river-level.

It may be useful to connect my journey briefly with the work of previous travellers in this region. From the Dalai Nor of Inner Mongolia to the Khalha river the greater part of our route lay eastward of Gerbillon's and westward of those of recent travellers. Fritsche, the pioneer of travel in the Khingan mountains, started from Hei-shui (Huc's Valley of Black Waters) on June 3, 1873, and arrived at Khailar on the 29th of the same month *viâ* Pai-t'a-tzu (White Pagoda) and Taikel Sume; in 1882 Lieut. Evtyugin followed the caravan route from the Argun river to Dolon Nor; Colonel Harnack of the Russian General Staff examined the Khingan mountains in the summer of 1887, and eventually reached Khailar (I understand that no account of this journey has been published); in 1891 Colonel Putiata, the Russian Military Agent in China, starting from Tientsin, explored the same range as far north as Entsigen Sume, a monastery on the west slope in lat. 45° N.; Dr. Franke's journey in 1896 lay largely along the route of Fritsche, I believe; in June, 1899, Potanin travelled eastward from Bur Nor (Buir or Buyur Nor) into the Aru-Khorchin country; and in the autumn of 1899 the expedition of Dr. Damaskin, to investigate the spread of bubonic plague in East Mongolia and North China, passed from Ganjur Sume south-eastward into the trans-Khingan region.

We followed the south bank of the Khalha river for four days to a crossing-place near the embouchure into Lake Bur. The most remarkable place in this section of the river is Ikhe Borhan Sume (Monastery of the Large Buddha), which was being repaired by Chinese masons and carpenters imported for the purpose from Dolon Nor. The enterprise of these men can be judged from the fact that they made the journey in a month on foot, practically working their way, for they started with light purses. They told me that their remuneration was equivalent to seven or eight ounces of silver (£1) a month. Everywhere in East Mongolia the temples and monasteries are repaired by itinerant Chinese workmen, the Mongols themselves being unable to do such work and unwilling to learn. Ikhe Borhan Sume is built on the incline of low hills bordering the river, and contains a recumbent image of Kuan-yin (Avalokiteswara), which lies in an open sloping courtyard, and is conspicuous for miles. The figure is a rude fabrication of stone and mortar, whitened with lime and ornamented with coloured washes, 40 feet

long and 30 broad, and more antique than most of the East Mongol shrines. Outside the main buildings a rough low wall of piled stones protected a curious border of Tibetan letters—each letter was 15 feet square, and neatly formed of stones hammered into the hillside—which ran along the edges and top of the temple enclosure. I distinguished this Tibetan prayer with my Zeiss glasses from a distance of 2 miles. Close by the river there is a very large and sacred *obo* and the remains of an ancient shrine which had suffered from inundation.

Here I met an itinerant Russian trader, with a Buriat interpreter, who was bartering Russian cloths, purple and red cottons, copper kettles, enamel ware, tinned ladles, matches, etc., for cattle, sheep, and wool. It was a new venture, and he was not entirely satisfied with the success of it. From him I received confirmation of a report which had reached me a few days previously that cholera was rife in Khailar.

Bur (Buir or Buyur) Nor.

At our point of crossing near the Bur Nor the Khalha river was split into two channels; the broader was 120 yards across, but shallow. Neither it nor the narrow channel, which was only 20 yards broad, ran deeper than 2½ to 3 feet. West of the crossing a thick growth of dwarf willow hid the view. The country was perfectly flat, and very slightly raised above the level of the lake. We camped at Khalha Hoshoin Sume on the Ursun Gol, which carries the overflow from Bur Nor to Kulun Nor; so slight was this on August 1 that I could scarcely discern the trend of the current. I followed the Ursun to the lake, which, though only 3 miles in a direct line south from the monastery, was quite invisible from it. At Khalha Hoshoin Sume, this river was 100 yards wide, and easily fordable. It winds in gentle curves, spreading into a morass in one or two places, and the stream broadens as one nears the Bur Nor. Where it leaves the lake there are two tiny islets, and it was sufficiently shallow to allow a drove of ponies to take refuge in it from the flies. A little east of south and half a dozen miles off a thicket of dwarf willow marked the place where the Khalha Gol disembogues. Across the lake to the west, an imposing yellow mass quivering in the belt of heated air, was Asar Sume, a Barhut monastery. From west to south the Bur Nor extended out of sight, and the slight breeze there was had lashed it into a thundering sea. There is not a boat on the lake, and no one has ever ventured to cross it. The Mongols, as usual, said that it was unfathomable. The shores were covered with wild-fowl—geese, ducks, plovers, gulls, terns, lapwing, cormorants, waders of many species—and a few conspicuous ospreys hovered over the Ursun, which was alive with fish. Two Mongols were spearing successfully—the only Mongol fishermen I have seen—and I bought some burbot and an 8-lb. carp from them.

At Khalha Hoshoin Sume we passed across the Ursun Gol into

Barhut territory. The Barhuts (the local pronunciation is Barûkh) occupy the region north of the Khalha river and Bur Nor, are organized into eight banners under much the same conditions as the Chahars, and are controlled by a Manchu official usually stationed at Khailar, which is known throughout East Mongolia as Amban Hota (Governor Town). The Barhut banners were summoned to arms in 1900 to oppose the Russian occupation, and from the temporary sadness which overtook most Barhuts when the subject was broached, I gathered that the experience was unpleasant. I heard later that the Khailar Amban had provoked hostilities by attacks on inoffensive Russian traders, in which the Barhuts displayed some audacity, but that the first skirmish with Russian troops—a short affair in which two or three hundred Mongols lost their lives—sent the Barhuts to their tents and tranquillized North-East Mongolia completely. I have small doubt that the Chahar banners could be pacified just as easily.

It was my intention to follow the Ursun Gol to Kulun Nor and to make an excursion to Khailar before turning westward towards Urga, but at Ulan Nor I heard that the cholera was more virulent than ever, that it had reached Ganjur Sume, a trading centre only 35 miles off, and that cases had occurred on the Ursun; and we saw Mongols trekking night and day westward in consequence. This form of cholera is not dangerous to Europeans who are careful of their diet, but I felt that it was hopeless to expect the necessary amount of caution from my followers, and forthwith decided to make for the Kerulon. Ulan Nor (Red Lake) is the "Oulan Poulac" (Red Spring) of Gerbillon. It is a long, narrow lagoon running westward from the Ursun and renowned for its pastures. Here in 1698 Gerbillion spent a week in the suite of the High Commissioners who were sent by the Emperor Kang-hsi to hold the first council of the Khalha princes, and Gerbillon's journal remained for two hundred years the solitary description in European literature of the Bur Dalai (Coupled Oceans), as this lake-region is called by the local Mongols.

On our way north-west to the Kerulon I ascended a prominent hill named Bogdo Ul (God's Mount), and obtained a remarkable view of the stretch of country between the lakes. Bogdo Ul rises only 1000 feet above the level of the Ursun Gol, but it towers over all the neighbouring heights, and was first noticed by me from an eminence south of the Khalha river 50 miles away. It is a limestone rock, surmounted by a collection of *obo*, which are much visited by pilgrims. A few gnarled elms grew in the folds and gave shelter to some buntings and warblers, and I saw dwarfed specimens of wild rhubarb amongst the scanty herbage. To east and south the view was unbounded, and was lost in a dim grey rift, which I took to be the Bur Nor; on west and north it was limited by hills, those on the north being high and bold. With my glasses I distinguished the brown marsh land of the south shore of Kulun Nor and the waters of the lake beyond it. I failed to observe a trace of

the Kerulon, and I understood the reason when I reached the bank of this famous river next day.

The Kerulon Valley.

My acquaintance with the Kerulon (pronounced Khérelon by the Khalhas) began on August 5, at a point less than two marches from its entrance into Kulun Nor, and 5 or 6 miles south-west of the Altan Emul (Golden Saddle), a pair of brown hills famous in Mongol legend, between which the river flows. With the exception of one large bend which we cut across, we kept along the river westward for 300 miles, to

THE MERGEN PRINCE AND HIS FAMILY.

the seat of the Tsetsen Khan; passed it further west on September 2; and in the third week of September I followed it once more from the neighbourhood of Jun Khure to one of its sources in the Kentei mountains.

Travellers in the Kerulon valley, excepting Gerbillon, have all been Russians. In 1870 the brothers Butin, and in 1882 Evtyugin, passed from the Siberian border through Sam Beise Urgo directly south to Dolon Nor; in 1893 Pozdnyéev crossed from the Khingan mountains (Pai-ta-tzu) north-west through the Middle Kerulon (Dalai Beise) to Jun Khure; Colonel Strelbitsky journeyed from Urga to Khailar in 1894 (the itinerary of this journey has not been published); Klementz visited Jun Khure and the Upper Kerulon in 1895; and in 1899 the Damaskin expedition before mentioned travelled from Urga to Ganjur

Sume, which is a couple of marches south-west of Khailar. (A preliminary sketch of this journey from the pen of M. Palibin, the botanist of the expedition, has appeared in the *Izvestia* of the Imperial Russian Geographical Society for 1901.)

The Kerulon is the Jordan of the Mongols. It is an inconsiderable river, but the longest in the vast arid Mongol highland, and the permanence of the pastures along its banks has always attracted a large share of the nomad population. Most of the princes of the East Khalkas (Tsetsen Khanate) keep their headquarters on or close to the Kerulon. An irregular belt of fresh green meadow, blotched by occasional brown marsh, follows the course of the stream, and varies from a mere riband to 4 or 5 miles of width; outside the meadows there is the ordinary steppe, often nitrous, or low hills, granite or sandstone, of a less rounded type than in East and South Mongolia. Near Altan Emul there were two channels wriggling through the meadows a short distance apart, the largest 18 yards broad and unfordable; the current was dark and troubled, and ran 3 or 4 miles an hour. Chagan Dure Nor (the Doure Nor of D'Anville's map) is a lagoon formed by overflow from the river. Dwarf willows line the banks at intervals, but there is no trace of forest vegetation on the hills, which are covered with sparse grasses, artemisia, and wild onion.

At Mergen Ul (August 11) the Kerulon is confined for a couple of miles in a gorge of sandstone hills, through which the stream, still coloured by dark alluvium, rushed with increased current. The boundary between the Barhut banners and the Tsetsen Khanate was passed a few miles west of Mergen Ul, and on August 13 we arrived at Sam Beise Urgo, which is marked on Russian maps as "Kerulon." The names of any but the very prominent physical features are always doubtful in Mongolia, but the traveller has special difficulty in dealing with the political subdivisions of the Tsetsen Khanate. To give an instance: For years I had heard at Peking of a district called by Chinese Minchasa, from which excellent specimens of the Mongol pony came to us regularly. I never could discover exactly where it was; my Chinese informants could only say it was "behind" and "very far," and none of the Mongols I came across had ever heard of it. It was only when I was within a day's march of Sam Beise Urgo that I learnt that the district known to the Mongols as Sam Beise was identical with the Chinese Minchasa. The subdivisions of the Mid-Kerulon country are named after the chiefs of the moment, and Minchasa is a Chinese pronunciation of Min Jassak (Chief Min), the grandfather of the present prince (named Sanselei Dordji), who is styled shortly Sam Beise (Prince Sam or San). Min Jassak ruled for a long period, and the Chinese traders, who are accustomed to attach permanent names to places, continue to use the designation by which this part of the Kerulon valley became first known to them.

Sam Beise Urgo (seat of Prince San) is the principal trading-place on the Kerulon; caravan routes from Urga, Khailar, and the Siberian and Chinese frontiers pass through it. There are two large monasteries on the north bank of the river, and in the neighbourhood live the representatives of forty Chinese firms of Peking, Kalgan, and Dolon Nor, who patiently barter silks and miscellaneous luxuries for cattle, ponies, hides, and wool. The oldest of these firms had commenced business on this spot seventy years previously. During the Boxer convulsion of 1900 they were all plundered and driven away at the instigation of some enterprising Russians, and at the time of my visit the prince and his subjects were performing, under pressure from Peking and Urga, the disagreeable duty of indemnifying the sufferers, whose claims, of course, exceeded the most sanguine estimates. Curiously enough, I had met close to Khara-balgas in Chaharia a band of the chief offenders in this robbery, who were under escort to Peking for trial and punishment —it was a striking illustration of what the Chinese Government can do in the administration of justice when they are in earnest. These men had ridden 1000 miles, and would ride 200 more, on their own ponies, to expiate an offence of no special enormity, and the duty of escorting them was entrusted to a few of their own friends and neighbours.

At Sam Beise Urgo the Kerulon was 30 to 40 yards wide and easily fordable; the bed was sandy, and the water fairly clear. I noticed a "dug-out" at one of the fords, and was told that it was usually required during summer freshets. We crossed the river at Sam Beise, and followed the caravan route along the north bank through half a dozen tribal subdivisions to the seat of Tsetsen Khan, who is *primus inter pares* of the East Khalha princes.

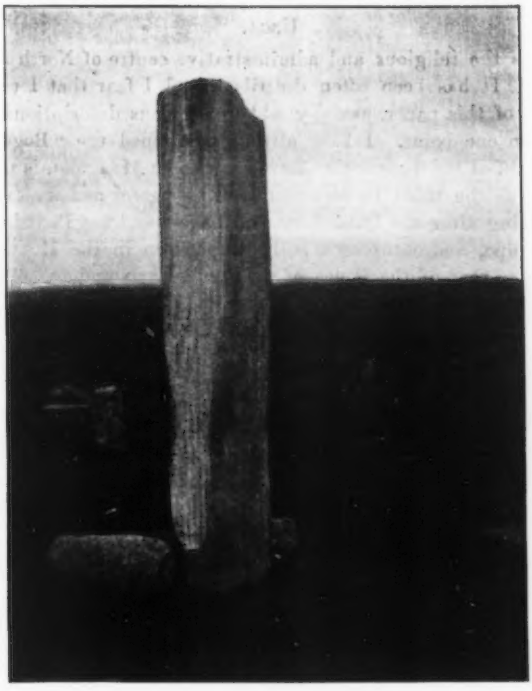
The ruins of Para-hota (Tiger Town) were reached on August 20. They were seen by Gerbillon in 1698, and his short description might stand for the present day. There are "grands pans de muraille de terre;" but he exaggerated the extent. I paced two sides, and found the enclosure a rectangle of 1600 yards by 1400. The earth-walls are now long grass-grown mounds, 4 to 5 feet high in the centre, and 30 broad, and outside them there are traces of a ditch. Three hundred yards from the centre of the west wall and outside the enclosure there is one of the "pyramids" of Gerbillon. It is a *dagoba* of brick, and it seems a marvel that a structure of the kind, which was "half-ruined" in 1698, should be erect in 1902. It is crumbling, but still stands, and its 40 feet of height make it a prominent landmark. Inside the city and some 200 yards from the centre of the south wall there is the other of Gerbillon's pyramids in much the same condition. It is also a *dagoba* or *chorten* of brick, 30 feet high. Near it I observed a large mound, 30 yards square and 4 feet high, of building *débris*—rubble stones, broken bricks, and fragments of marble, but no blue tiles or potsherds. Besides this I saw a few heaps of stones, which might have been the sites of

buildings; but the rest of the enclosure was a flat expanse of steppe, which could not have been much built over at any time. Para-hota (Klaproth rendered it Bars-hotun, from a transliteration of the Chinese ideographs) is a relic of the Yuan dynasty, and is said to have been founded by Toghon Timur in the middle of the fourteenth century.

The Khalha chieftains, whose seats I had an opportunity of examining—Sam Beise, Batur Jassak, Akhse Wang (these two chiefs had died recently), Dalai Daichin Jassak, Tsetsen Jassak — were housed in the national dwellings, Mongol *gher* (circular felt tents); but the residence of the Tsetsen Khan is a permanent brick-and-tile structure of the Chinese type, and if it were not for a private chapel built into the south-west angle, distinguished by red walls and a gilt ornament on the roof, I should not have hesitated to class it as a second-rate Chinese yamen. All these chiefs live in the neighbourhood of their territorial monasteries, which are the only fixed habitations here as elsewhere in East and North Mongolia. They are, as a rule, of brick; along the Khalha and Kerulon I saw a few which were almost wholly of timber. In most there are pavilions and porticoes differing slightly from those of Chinese Buddhistic temples, but the design of the principal chapel is often pure Tibetan.

Nearing the Tsetsen Khan's palace I observed, tethered to two long lines in the open plain, some forty ponies, of all ages, from two-year-olds upwards. It was the racing-stud of the prince, and the most renowned in Mongolia. Racing is the national pastime; it is, in the main, a fair-weather sport. From May to August pony races are the attraction at the temple festivals and fairs throughout East and North Mongolia, and most considerable owners train a selection from their speediest ponies for the local meetings. A racing-stud of dimensions commensurate with rank and wealth is the proper appanage of a prince or *jassak*, and his "string" usually includes some of the fastest beasts of his district. The races are never under 10 miles long; the "Derby" of Mongolia is a contest over 30 miles of rough steppe. There are prizes to winners, rarely of tempting value; in the Chahar country the "stakes" was usually an ounce or two of silver (2*s.* 6*d.* or 5*s.*). I constantly heard of matches between rival owners proud of the reputation of their stock, but seldom of serious wagers on the result. It is worth remembering that Mongol races are usually run under ecclesiastical auspices. A race-meeting I attended in the Chahar country in 1899 was presided over by the local *gegen* (avatar), and the competing ponies were mostly owned by lamas. The great races which take place yearly at Urga are held under the direct patronage of the Bogdo (Lama Pope of Mongolia), who becomes the owner of all the winners. A horse-race with a bishop in the judge's box, a public chiefly clerical, no bookmakers or betting, and nominal prizes, is a phenomenon entitled to a little attention from an Englishman.

On August 29 we broke camp from the Tsetsen Khan's headquarters, left the Kerulon, which continues south-westward for another 100 miles before turning sharply to the north, and steered a direct course for Urga. The Taragilch Gol, the first perennial affluent of the Kerulon met with, was passed between two notable hills called "The Lord" and "The Lady" (Noyon Ul and Khaton Ul), and thenceforward with a few short intervals of plain we were constantly making fairly sharp ascents



STONE PILLAR WITH OLD TURKISH INSCRIPTIONS (TOMB OF TONYUKUK, NEAR URGA).

or descents, until the Kerulon valley was struck again. The higher hills were granite, and they appeared to burst through strata of shale and slate; the castings from the many marmot burrows were invariably a sharp gravel of shale or slate. The noteworthy *cols* were the Hannungin Daban (3700 feet) and the Joldungin Daban (4000 feet), both of which taxed the temper and strength of the cart-camel. From the Joldungin Daban we descended into the narrow valley of the Chinkir Gol, another affluent of the Kerulon, and west of it on Sibir Ul we saw

for the first time in these parts a slender fringe of pine forest. At the Tsetsen Khan's seat the Kerulon was over 100 yards wide, but fordable everywhere; the bed was sand and gravel, and the water still clouded with sediment. When we passed it on September 2, it was split into two swift clear streams a mile apart, both of which were formidable obstacles to carts. On September 4 we crossed the water-parting into the valley of the Tola, and next day reached Urga and the bounteous hospitality of my friend, Mr. von Grot, and other members of the Russian colony.

Urga.

Urga is the religious and administrative centre of North and East Mongolia. It has been often described, and I fear that I cannot, in the limits of this paper, usefully add to previous descriptions, except, perhaps, on one point. I have already mentioned the "Bogdo." He is the pontiff of the Lamaistic Church in North Mongolia, is popularly venerated as the third in importance of the great avatars, or "living gods," coming after the Dalai Lama of Lhassa and the Pantshen Lama of Tashilunpo, and occupies a political position in the Mongol world analogous to that of the Popes of mediæval Christendom. The ecclesiastical title is *Cheptsun Damba Khutukhtu*, which was originally conferred by the Dalai Lama of Tibet in A.D. 1653 on a son of the Tushetu Khan. This prince, the first "Bogdo," was the St. Paul of Mongol Lamaism, and is known in Mongol history as Undur Gegen. Under his advice the Khalha tribes gravitated to China, rather than to Russia, in 1688, when the attacks of the Kalmucks under Galdan threatened their existence. He is the "Grand Lama Houtouktou" who figures so largely in Gerbillon's description of the assembly of the Khalha princes held by Kanghsi at Dolon Nor in 1691. Ever since his death in 1723, the Urga pontiffs have come from Tibet, and the present Bogdo, the eighth "incarnation" living in Mongolia, is the son of a steward in the Court of the Dalai Lama of Lhassa. He was born in 1870, and was invested and brought to Urga when a child of four. His education does not seem to have fitted him to fill the position of a living deity with dignity or wisdom, and since he passed from tutelage the demands of his court on the purses of the Khalhas have become a burdensome tax. I was a trifle surprised to learn that he was married and openly appeared at festivals with his wife and child. Devout Mongols who are asked to explain this mode of life, singular in the head of a celibate church, assert that it is a subjective hallucination only apparent to the unfaithful.

The Kentei Mountains.

After arranging for the disposal of my camel caravan, I made a rapid journey with Mr. von Grot through Jun Khure to some gold-mines on the Terelchi Gol, 150 miles north-east of Urga. The Terelchi

is one of the upper feeders of the Kerulon, and the gold-mines here and on the Iro river (a feeder of the Selenga) are worked by a Russian company, which holds a monopoly of mining enterprise in the Tsetsen and Tushetu Khanates. Many of the valleys radiating from the Kentei range are auriferous, and some are evidently rich enough in gold to repay the attention of capitalists. I may mention here that, with the exception of gold-washings on the east slopes of the Southern Khingan, I neither saw nor heard of mineral products of any commercial importance until I reached the Kerulon.

A two-days' ride from the Terelchi gold-mines along the Kerulon—now a shallow stony stream of variable width, rapid and clear—through lone valleys, which are marshy in summer and frozen during the remainder of the year, brought me to the foot of the Kentei *massif*. This is the holiest of the many holy mountains in Mongolia. Thither every autumn the Manchu Amban comes from Urga, with a retinue of magnitude, to make oblation to the great nature-spirits, and Mongols and Chinese alike make pilgrimages from great distances to enlist their favour.

Our camping-place (4500 feet) was strewn with the remains of fires, mutton bones, skeletons of camels, felled logs, and broken carts, relics of the yearly visits of the Urga Amban. I rode up the mountain, through a thick forest of pine, larch, and cedar, to the *dalai* (ocean), the sacred lakelet on the south slope of Kentei. It is an irregular oblong, 1000 yards from east to west, by 300 to 400, and approximating 5600 feet above sea-level. Of course, the Mongol guide (a pleasant lama friend of Mr. von Grot) said that it was bottomless, but the water, though limpid, had not the dark azure of great depths. The shore is easily accessible on the east side; elsewhere the rocks rise steeply from the water's edge. Bleached driftwood cumbered this east beach, and a large *obo* was formed of it, before which our lama prayed long and earnestly and burnt a paper invocation. He also drank some of the water, which is credited with therapeutic qualities of supernatural origin. I have seldom felt the charm of a scene so much, and I noticed that both of my companions, the lama and a matter-of-fact Chinese soldier, were unusually silent and contemplative.

Next morning (September 21) we mounted to the summit of Kentei. At 7 a.m. in our camp the thermometer stood at 29°, but as we emerged on the exposed ridge above a strong nor'-wester drove it down to 17°, and the crests of the higher hills were veiled with snow. In half an hour we reached the main altar where the Amban worships. Before a large tree *obo*, festooned with prayer flags, there are rough tables of larch, with a boarding in front, on which the Amban kneels, and before this again there was a large earthenware cauldron full of *airak* (fermented mare's milk). Our lama stirred the *airak* with a pole, and produced from the depths remains of *hatakh* (scarf-offerings), walnuts,

and tea-leaves. Close by the cauldron on the top of a small stone pile I noticed some clay masks, open-jawed, of conspicuously evil expression. The ground was covered with walnuts, cheese, *hatakh*, and Tibetan prayers written on calico and on paper. The lama prostrated himself thrice at full length before the *obo*, and added a rag to it; the Chinese guard contented himself with one prostration and an offering of a piece of bread, which he placed at the foot of the tree. On my return journey I disturbed a capercailzie who was feeding on the walnuts around this altar, and, secure in the prohibition against shooting on the sacred mountain, he perched on a branch close by and watched me take some photographs.

The summit (6600 feet) was reached without difficulty, except for the wind. The pilgrimages of centuries have marked recognizable paths, and Mongols ride the whole way up over tree-roots and fallen trunks. The slope was forested, but the broad uneven crest was blown bare of trees, and its surface was a mass of large loose stones of irregular shapes. When approaching the mountain, I observed from a distance of 6 miles a rounded *boss* on the summit which had been mentioned to me by Mr. von Grot. I clambered over this, and found it to be an oval tumulus, 250 yards long east and west, and 200 yards north and south, of the same loose stones which cover the mountain. I had no doubt that it was a human creation. There are two large stone *obo* on the crest of the tumulus, and on one of them there were the remains of a bronze censer. From a fragment of a Manchu inscription on this, which I copied, M. Dolbejev, of the Russian Consulate at Urga, read the date of the twelfth year of Chien-lung (A.D. 1748).

This is a remarkable tumulus, probably the largest in Mongolia. I am unable to believe that it is merely a prayer cairn, and it is a conjecture of Mr. von Grot, which I think is entitled to attention, that we have here the veritable tomb of Jinghis. Though we are informed that the body of Jinghis was borne secretly from the north of Shansi, where he died (A.D. 1227), into Mongolia, and that the guards killed every one they met "sur cette longue route," to prevent the news of his death spreading prematurely, there is no indication that the place of burial was kept a secret, and it is singular that it is not definitely known to Mongols. It is true that Potanin discovered in 1884, in the north-east corner of the Ordos country, a shrine composed of two felt tents and some wooden huts, which is said locally to mark the "remains" of Jinghis; but this appears to be a merely local belief at variance with all the earlier records. D'Ohsson, on the authority of Raschid (who wrote seventy or eighty years after the death of Jinghis), says that Jinghis was buried "sur l'une des montagnes qui forment la chaine du Bourcan-Caldoun, d'où sortent les fleuves Onan, Kéroulan, et Toula," and he concludes that "on peut admettre comme certain d'après le témoignage de Raschid, de Marco Polo et de Gaubil, que Tchinguiz-

Khan et plusieurs princes de sa dynastie furent enterrés près des sources de l'Onon et du Kéroulan." In a note to his translation of a portion of Raschid, Quatremère says, "Il me parait donc bien demontré que la montagne de Bourkhan-Kaldoun est identique avec celle que les Manchous appellent *Han-alin* (la montagne de Han ou de Kan) et que le P. Gerbillon désigne sous le nom de Kentey." Ssanang Setzen names the burial-place, "Yekeh Utek between the north slope of the Altai Khan and the south slope of the Kentei Khan," and in his description of the funeral mentions that the two-wheeled cart bearing the coffin stuck in the "blue clay soil" (this would point to the marshy valleys of the Upper Kerulon), and that a mound was raised over the grave.

A RECENTLY MUTILATED SACRIFICIAL STONE (TOMB OF KULTEGIN, ORKHON VALLEY).

The official Yüan history places the interment on Mount Kinien, north of the Gobi, which was also the sepulchre of Jinghis' successors. Gaubil remarks that the position of Mount Kinien is not stated exactly in this history, but he adds, "plusieurs seigneurs *Mongous* de la famille de Gentchiscan ont dit ici (Peking) que Gentchiscan est enterré sur la montagne de *Han*—Montagne *Han*, lat. 47° 54′, long. 9° 3′ occident."

To me it seems that Mount Kentei is indicated. The possible alternative is the Bogdo Ul closing the Urga valley on the south, still called Han-shan (Khan-ul, the Han Alin of D'Anville's map) by Chinese, on the crest of which there is also a tumulus of some dimensions.

I may remark here on the curious analogy between the Kentei Shan and Paik-tu San, the sacred mountain of North Korea. On the flanks of both three rivers take their rise—Tumen, Yalu, and Sungari on Paik-tu San; Onon, Kerulon, and Tola on Kentei—there are holy lakes near the summits of both, and both are revered officially. These official obeisances in the case of Kentei are performed on the slope of the mountain, but the Korean officials are content to worship their "ancestral mountain" from the first point of vision, which is probably 70 miles off.

Tomb of Tonyukuk.

I returned rapidly to the Terelchi mines and Urga, and on September 27 visited, in company with Mr. Evstiféyev, a Russian friend who is well-versed in Siberian archæology, the tomb of Tonyukuk (Tonjukuk). It lies in a broad open valley called Bain Sukht, some 8 miles south of the Tola, and an easy day's ride, say 30 miles, south-east of Urga. When I reached this remarkable monument, which stands prominently on swelling ground 2 miles from the base of the higher hills, I could not help reflecting on the curious fact that two scientific expeditions, the Finnish of 1890, and the Russian of 1891 under Radlov, specially equipped for archæological researches, had spent some days at Urga, and a score of other scientific and inquiring travellers had passed within a few miles, without hearing of its existence. It is a striking illustration of the narrow circle within which information on any Mongol antiquity is obtainable, and should be an incentive to further leisurely and systematic search. Madame Klementz, the intrepid wife of the well-known Siberian archæologist, stumbled across it in her botanical excursions, and fortunately was alive to the importance of the old Turkish inscriptions covering two upright, rudely squared stones. These have been deciphered by Radlov, and the history of Tonyukuk, an old Turkish hero, who flourished in the seventh century, has been pieced together from Chinese sources by Prof. Hirth. I am only concerned here to mention that on September 28 of last year a hole had been dug recently in the tomb enclosure, and the brickwork, which evidently protects the sepulchre, exposed. For superstitious reasons, Mongols, as a rule, are the last persons to commit this sort of vandalism, and it was the impression of Mr. Evstiféyev and myself that foreign influence might be responsible in this instance In any case, it is altogether desirable that some intelligent supervision of this almost unique monument should be instituted to put a stop to further demolition by unskilled and unscientific persons.

The Orkhon Valley and Erdeni Tsu (Karakorum).

I spent the greater part of October in another rapid expedition to the Orkhon river and Erdeni-Tsu, in company with M. Evstiféyev.

The wide valley of this great affluent of the Selenga abounds in luxuriant pastures, the great attraction for nomads, and it is safe to conclude, from the many monuments and ruins which have been discovered of late years, that this favoured region was the centre of the old Turkish and Uigur dominions, as it was the headquarters of Ogotai and his immediate successors. Since Yadrintsev discovered, in 1885, the bilingual monuments (Chinese and old Turkish) in honour of the last great Turkish Khan, Mogilan, and his brother Kultegin, two scientific expeditions have examined this neighbourhood, and the results have been published by the Finno-Ugrian Society of Helsingfors, and by the Russian Imperial Academy of Sciences. The great finds, of course, were the long inscriptions in an unknown writing, of which some fragmentary specimens had been found in the Yenesei valley from the days of Messerschmidt. With the new material obtained from the tombs of Kultegin and Mogilan, Prof. Thomsen of Copenhagen, whose scholarly ingenuity in this matter has scarcely been noticed adequately, was able to supply the key which Radlov applied, and we now know the purport of these inscriptions. They confirm the national Turkish traditions which Raschid and Jowaini have handed down from lost Uigur books, that the valleys of the Orkhon and upper Selenga were the original home of the Turks.

I must sound a note of warning with regard to the tomb of Kultegin. The local Mongols received orders, in 1896 or 1897, from the Chinese Government to preserve the Chinese inscription (the Chinese inscription is on one side of the stone, and the Turkish on the reverse side), and when I visited the tomb on October 15 it was sheltered by a solid brick-and-tile structure of Chinese pattern. Unfortunately, the walls are built up to the sides of the memorial stone, the joints between it and the walls are cemented, and it is now impossible to examine the Turkish inscription, which, of course, must suffer in damp seasons by being boxed up in this fashion. It was especially irritating to see that the workmen sent to construct this shelter had obtained their basement course of grey granite by chiselling 2 feet off the side of an enormous sacrificial stone or plinth. I venture to invite the attention of Russian archæologists to this alarming treatment of one of the most interesting antiquities in Northern Asia.

The turning-point of my Orkhon journey was Erdeni-Tsu, which is marked on the old Jesuit maps as Erdeni Chao. Erdeni-Tsu was the first lamaistic shrine established in the Khalha Khanates, and, according to Mongol records which have been translated by Pozdnyéev, it was founded in 1586 in the city which had been the residence of Jinghis' son, Ogotai; that is to say, in the old Mongol capital, Karakorum. The existing monastery, which, if it is overshadowed politically by those of Urga, is still the most venerated of Mongolian holy places, is a collection of temples and shrines enclosed by a square of mud walls,

500 yards in the side and 15 feet high. It lies on the north slope of low bare hills, but westward the view is bounded by the forested ridges of the Khangai range. The walls, as usual, face the cardinal points; there is a large gate in the centre of each, and white dagobas (*sobergha*), built at intervals of 20 to 25 yards, take the place of bastions. There are a number of old monumental stones with inscriptions, which the Radlov Expedition examined, but I was most interested by the uneven space north and north-east of the monastery walls. There one finds an area of three-quarters of a square mile covered with irregular mounds, which attract notice at once as not being natural. Walking over this I observed pieces of tiles, broken bricks, and occasional lumps of granite, which showed traces of the chisel. At first I thought, seeing a number of refuse heaps scattered about, that these bricks and tiles might have been deposited in the course of the last three hundred years by the inhabitants of the monastery, but I had opportunities of assuring myself that they were really independent remains of old buildings. A portion of one of the mounds had been worn at the side by cart traffic, and another had been excavated recently; and in the exposed parts I saw bricks and tiles, whole and broken, embedded in the earth in a manner to banish all doubt. This area is the site of an ancient town which has been covered by aerial action, assisted by a yearly thatch of dwarf artemisia and grasses. At a mile and a half to the north of the monastery I struck a *balgas*, running east and west for 1200 paces, and north and south again for 800. Karakorum undoubtedly lay in this part of the Orkhon valley, and though Paderin was under the justifiable impression when, in 1873, he visited Khara-balgas, which is 20 miles north of Erdeni-Tsu and is now believed to have been the headquarters of an Uigur king, that he had found the site of Ogotai's capital, the evidence of the Erdenin Erikhe produced by Pozdnyéev, and the existence of the ruins I have roughly described above, make it more than probable that Erdeni-Tsu is the real site. If the Mongols could be won from their present rabid opposition to archæological delving, it might be possible to change this probability into a certainty.

My return journey to Urga, and eventually to Kiakhta (Troitskosavsk), Verkhne Udinsk, and the Great Siberian Railway, does not call for any observation in this paper.

Mr. Campbell's Map.—The map is constructed from a route survey by sub-surveyor Chabeh Singh, in conjunction with Mr. Campbell.

The Chairman (Colonel G. E. Church, Vice-President): Our paper this evening will be read by an old friend of the Society, who some twelve years ago appeared before us and read a paper on an interesting voyage which he made in Korea. Since that time his long residence in China has made him, perhaps, the best person possible for the explorations which he has made in Mongolia. I may say that he was with Sir E. Seymour in the attempt to relieve the Legations in Peking

during the Boxer movement, and afterwards at Tientsin he was seriously wounded. He was for a long time a Chinese Secretary of Legation, so that his numerous qualifications for giving us an interesting paper scarcely need to be enlarged upon. I will call upon him, therefore, to take us with him this evening to Mongolia.

After the reading of the paper—

Colonel MANIFOLD said: I am afraid I can say very little on Mr. Campbell's most interesting paper, because I am not acquainted actually with Mongolia. It has now been recognized, I am glad to say, that particular attention must be paid to particular provinces, so that a man who has studied one province in China will probably know very little about a distant one. It so happens that I chiefly paid attention to provinces in the very opposite extreme—the provinces of the upper Yangtse, so I cannot say much about the paper beyond that I recognize what great value it must be to geographical research. Mr. Campbell has hardly laid enough stress on the admirable survey he carried out—a most accurate one. Lately, wherever exploration work has been carried on in China, a careful plane-table survey has been made, and such a survey is not only of interest to us from a geographical point of view, but also from the fact that China is one of the great places we have to look forward to for future trade as other countries get shut off, and there is no doubt but that a great development is likely to take place of British commercial interest, and all accurate survey that is carried out must invariably help to solve the problems which bear upon commerce. I had the pleasure of spending a year at Peking with Mr. Campbell just after the relief of the Legations, and I do not think it is recognized what tremendous geographical ardour Mr. Campbell must have had to carry him through his journey. During that year he was badly laid up, suffering from the effects of the wound he received when acting as one of the defenders of Tientsin—a siege which has not had nearly enough attention given to it. It was a very much more important siege than that of Peking, as the Chinese made a much more determined attack, and Mr. Campbell, in spite of the fact that he was suffering for a whole year from this wound, never allowed it to deter him from making this journey. In conclusion, I can only say I have listened with great pleasure to his paper, and I am sure his remarks are of the greatest value.

Mr. DELMAR MORGAN: I cannot add very much to what has already been so admirably told by Mr. Campbell of Mongolia. We are all, I feel sure, delighted to welcome him home after his long period of foreign service, during which he distinguished himself so greatly. Notwithstanding the illness and wound from which he suffered, he has succeeded in accomplishing a remarkable journey through a little-known part of Mongolia, and has communicated the results of his observations and investigations in the paper we have heard read this evening. Few travellers have visited the supposed site of Jinghiz Khan's capital, and those few mostly Russians. That conqueror founded an empire so vast that it comprised nearly the whole of Asia and extended to Eastern Europe, and in the words of the late Sir Henry Yule, writing of the times of the Venetian mediæval travellers, "In Asia and Eastern Europe, scarcely a dog might bark without Mongol leave." Jinghiz and his descendants founded the Yuan dynasty of China, and this country is to this day ruled by Manchu sovereigns of the same stock as the Mongols. Sir Henry Howorth has told us in his history of the princes and tribes of the Mongols, and he might have made some interesting remarks on Mr. Campbell's paper had he been here this evening, especially with reference to the discovery of the supposed burial-place of Jinghiz. The Khalkas are, as the lecturer told us, the finest specimens of the race, inhabiting the northern parts bordering on Russia, while to the south the Tsakhars, or Chakhars, have mixed with the Chinese and lost much of the Mongol

type and character. Mongolia may yet play an important part in the future of Asia, owing to the facilities its vast plains afford to the construction of railroads converging on China. The Russians are making a special study of it, *e.g.* Pozdnéyef's great work referred to by Mr. Campbell, and it is hardly doubtful that in course of time they will open up communications through it as they have done in Western Turkestan and Manchuria. Nothing is more remarkable than the revolution they have brought about within the last twenty or thirty years by their conquests in Central Asia, and all geographers and travellers must feel grateful to them for the ease and security with which the most remote and formerly inaccessible regions can now be reached.

The CHAIRMAN: Perhaps the most interesting and fascinating regions of this Earth are the arid ones, and especially that great belt which extends from the Atlantic ocean through to the Pacific, crossing the Sahara, Arabia, Persia, and Central Asia, until we reach the great tableland Mongolia. The latter, I believe, is about 3000 feet above the sea, 1700 miles in length from east to west, and 1000 miles in width. Part of this area is occupied by the great desert of Gobi, 1200 miles long and about 500 miles wide. This central Asian plateau has given the world a great deal of history. The Mongolian race, tough, hardy, brought up in a climate where there are extremes of heat and cold, raising their flocks and herds, here to-day, there to-morrow, always restless, always war-like, always predatory, they have made their mark upon the history of the world perhaps as no other people have over so long a period, and therefore the paper to which we have listened this evening regarding Mongolia is of peculiar interest. I would like to call your attention to what it was that enabled these Mongolian and Central Asian tribes to make their wars and keep all humanity in turmoil. It was the horse. Mongolia is his native home, and from time immemorial he has been the link by which the tribes have sustained a rudimentary form of society. So long as he offered the fastest means of locomotion, so long as he enabled them to mobilize their forces and pour their hordes upon the sedentary races, so long they dominated the position; but when modern invention created means of better mobilization, when the railway came, when organized armies were formed, when modern methods of defence became known and gunpowder began to make havoc, the day of the nomad was done. He began to be tamed down, and for his taming perhaps the civilized world is more indebted to Russia than it is willing to acknowledge. And Russia, having put her hand to the plough, has dominated, as it were, all these wandering races, and probably cannot stop until the task is completed. Therefore it is that a remarkable comparison may be made between the pastoral and nomadic races and the sedentary ones. Up to the time the horse was the fastest means of moving armies, the pastoral and nomadic races were masters of the world. When they were dominant, they so threatened the Chinese Empire that the Chinese had to build the Great Wall about 220 B.C.; but four centuries afterwards a series of terrific onslaughts from the Mongolians conquered China and divided it into a northern and southern empire. Afterwards, in 1213, came Jinghiz Khan, that great conqueror of whom you have heard mention already. He victoriously stormed over the Great Wall with a vast army. Then followed Kublai Khan in 1260; he overran China and established the Yen dynasty, which lasted over a century. Later the Mongolians assisted the Manchus under Choun-Tchi, who in the latter half of the fourteenth century captured Peking and founded the dynasty which still rules the Flowery Land. But it is a curious fact that, while the nomad race has so often been the conqueror of China, China has always absorbed its conquerors. I think, as the hour is late, I will make no further remarks, but on your behalf I assume the honour of conveying to Mr. Campbell your cordial thanks

for his lecture, and to those thanks I hope I may be permitted to add my own and my full appreciation of the knowledge which he has conveyed, and which has thrown light upon a very interesting region of this Earth's surface.

BATHYMETRICAL SURVEY OF THE FRESH-WATER LOCHS OF SCOTLAND.*

Under the Direction of Sir JOHN MURRAY, K.C.B., F.R.S., D.Sc., etc., and LAURENCE PULLAR, F.R.S.E.

Introductory.

During the past season the survey of the Scottish fresh-water lochs has been continued with success. The bathymetrical survey of nearly all the principal lochs on the mainland, on the Orkneys, on the Shetlands, and on the Lews, has now been completed; the field-work for the present year was brought to a close towards the end of October. Next spring the field-work will be again resumed, and it is believed that, in the course of a few months, the remaining lochs of Scotland will have been surveyed—at least all the lochs exceeding half a mile in length, on which there are rowing-boats.

During the past summer a small yacht was permanently anchored in 300 feet of water in Loch Ness, and connected with the shore by means of an electric cable. On board the yacht three cables were fitted up with platinum resistance thermometers, which could be lowered to varying depths; the temperature at these depths could then be recorded on shore. The results show very remarkable changes of temperature, especially at depths of 200 and 250 feet, apparently depending on the direction of the wind blowing over the surface of the loch. At the same time temperature observations have been carried out on board a small steam-yacht with the ordinary reversing thermometers, all along the length of the lake.

A large number of other physical observations have also been carried on, and the biologists have been examining in great detail the bathymetrical distribution of organisms in Loch Ness and some adjacent lochs. These observations will be continued at Fort Augustus during the coming winter by members of the Lake Survey staff, and the results will be published at a later date.

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* Continued from p. 269. Maps, p. 600. Map I. shows Loch Tummel, the contour-lines of depth being drawn in at 25, 50, 75, 100, and 125 feet. Maps II. and III. show Loch Tay in two portions, the contour-lines of depth being drawn in at 50, 100, 200, 300, 400, and 500 feet. Map IV. shows Lochs Derculich, Scoly, Ordie, na Craige and Kennard, and Skiach, the contour-lines of depth being drawn in at 10, 25, and 50 feet. Map V. shows Lochs Broom, Essan, Lochan Breaclaich, Lochan na Lairige, Lochs Daimh and Giorra, the contour-lines of depth being drawn in at 5, 10, 25, 50, and 75 feet.

Part III.—Lochs of the Tay Basin.

The present communication deals with the lochs of the Tay basin, in continuation of the paper published in September last. The next paper, completing the account of the Tay basin lochs, will be published in January, and will be accompanied by a description of the geology of the region by Dr. John Horne, F.R.S., and Dr. B. N. Peach, F.R.S., including a geological map.

7. *Loch Tummel.*

Loch Tummel is situated amid beautiful scenery, rock, wood, and water being combined in such a way as to present pictures of rare

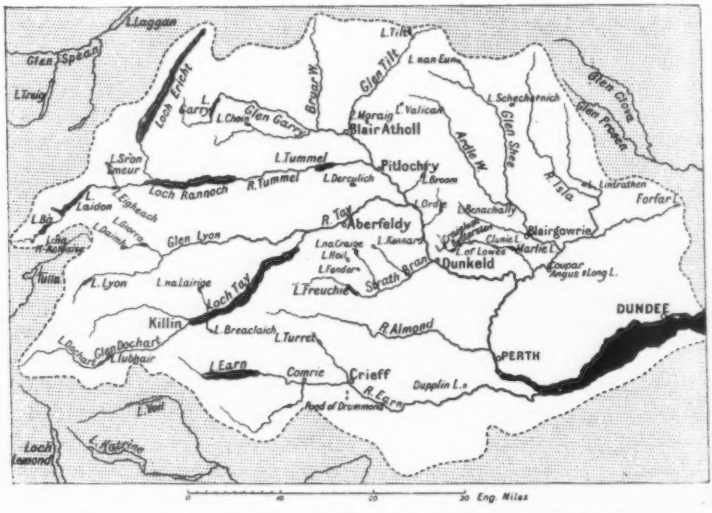

FIG. 1.—INDEX MAP OF THE TAY BASIN, BY J. G. BARTHOLOMEW, F.R.G.S.

loveliness, the crests of Farragon, Meall Tarruinn Chon, and Schiehallion rising to great heights to the south and south-west. It contains large trout and a great many pike. Loch Tummel is 2¾ miles in length, with a maximum breadth of half a mile, the mean breadth being a little over one-third of a mile, or 13 per cent. of the length. Its waters cover an area of 630 acres, or rather less than a square mile. It drains directly an area of 62½ square miles, but since it receives the outflow from Lochs Rannoch, Laidon, Bà, etc., its total drainage area is about 306 square miles, or 312 times the area of the loch. Nearly 300 soundings were taken in Loch Tummel, the maximum depth observed being 128 feet, or 4 feet more than the maximum depth recorded by Mr. Grant-Wilson, who took 123 soundings in 1888.

The volume of water contained in the loch is estimated at 1,316,635,000 cubic feet, and the mean depth at 48 feet, or 37½ per cent. of the maximum depth. The length of the loch is 113 times the maximum depth, and 302 times the mean depth. The floor of Loch Tummel is irregular, falling into three deep basins separated by two ridges, the maximum depth on the westerly ridge being 52 feet, and the maximum depth on the easterly ridge being 56 feet. The deepest of the three basins is situated near the west end of the loch, the maximum depth of 128 feet occupying a central position in this basin, but a short distance to the south a sounding of 74 feet is recorded in close proximity to a sounding of 127 feet. The 100-feet contour-line in this western basin

FIG. 2.—LOCH TUMMEL.
(*Photo by J. Parsons, B.Sc.*)

is almost circular and nearly one-third of a mile in diameter; about one-fifth of a mile to the east is an isolated sounding of 102 feet, surrounded by shallower water. The central 100-feet basin is oblong in outline, and nearly half a mile in length, the maximum depth of 119 feet having been observed towards the eastern end of the basin. The eastern basin just falls short of attaining a depth of 100 feet, the maximum observed being 99 feet; the 75-feet contour is approximately oblong in outline, and nearly one-third of a mile in length. The 50-feet basin is a continuous area stretching from about a quarter of a mile from the west end to within 100 yards from the east end of the loch, and is nearly 2½ miles in length.

The area of the lake-floor covered by less than 50 feet of water is about 352 acres, or 56 per cent. of the entire area of the loch; the area covered by water between 50 and 100 feet in depth is about 217 acres, or 34½ per cent.; and that covered by more than 100 feet of water is about 60 acres, or 9½ per cent. of the total area of the loch.

Loch Tummel was surveyed on April 23 and 24, 1902, by Dr. Johnston, Mr. Parsons, Mr. Clark, and Mr. M'Intosh, the level of the surface of the water being found, by levelling from Ordnance Survey bench-mark, to be 454·5 feet above the sea. When levelled by the surveyors of the Ordnance Survey on June 26, 1860, the surface of the water was found to be 453·3 feet above sea-level.

The temperature of the surface water of Loch Tummel at 1.30 p.m. on April 23, 1902, was 43°·2 Fahr. (the air-temperature at the time being 49°·2); at 9.45 a.m. on the next day (April 24) the surface temperature was 45°·0 (air-temperature 49°·0), and at 1 p.m. in the centre of the loch the surface temperature was 43°·5. A series of temperatures was taken below the surface at 1 p.m. on April 24, 1902, in 102 feet of water, with the following results:—

Surface	...	...	...	...	...	...	43°·5	Fahr.
5 feet	...	...	...	...	...	...	43°·5	„
10 „	...	...	...	...	...	...	43°·4	„
20 „	...	...	...	...	...	...	43°·2	„
50 „	...	...	...	...	...	...	43°·0	„
70 „	...	...	...	...	...	...	42°·6	„
100 „	...	...	...	...	...	...	42°·4	„

showing a gradual decrease of temperature from surface to bottom, the range of temperature being 1°·1 in the 100 feet of water.

About 3 miles to the south-west of Loch Tummel lies Loch Kinardochy,* a small hill loch containing pike, which flows into the river Tummel just before it enters Loch Tummel.

8. *Loch Tay.*

Loch Tay is one of the largest of the Scottish fresh-water lochs, unsurpassed in the beauty of its surroundings, and well known to anglers on account of its salmon fishings, which are among the best in Scotland. It is also a good trout-fishing loch, having been much improved within recent years by being stocked with Loch Leven trout. The scenery around the loch is very fine,—grand and wild towards the south-west end, with the mighty Ben Lawers rising from its northern shores about halfway down the loch, becoming more sylvan in character towards the north-east end, a splendid view presenting itself to the eyes of a spectator from Kenmore bridge (see Fig. 3).

Loch Tay is the largest loch in the basin of the river Tay, though

* Loch of the end of the high field.

Loch Ericht is a very formidable rival for this distinction, as will be seen from the following comparison:—

	Loch Tay.	Loch Ericht.
Length	14·55 miles.	14·5 miles.
Maximum breadth ...	1·07 mile.	1·0 mile.
Mean breadth ...	0·70 mile.	0·5 mile.
Superficial area ...	10·19 square miles.	7·21 square miles.
Maximum depth ...	508 feet.	512 feet.
Mean depth	199·076 feet.	189·201 feet.
Volume of water ...	56,550 million cubic feet.	38,027 million cubic feet.

This comparison shows that the maximum depth observed in Loch Ericht slightly exceeds that observed in Loch Tay, but in all other respects Loch Tay has the advantage, though as regards length and maximum breadth the two lochs are almost identical.

Loch Tay is over 14½ miles in length, and over one mile in maximum breadth, the mean breadth being nearly three-quarters of a mile, or nearly 5 per cent. of the length. Its waters cover an area of over 6500 acres, or over 10 square miles, and it drains directly an area of about 187½ square miles, but since it receives the outflow from Lochs Dochart and Iubhair its total drainage area is over 232 square miles, or nearly 23 times the area of the loch. Nearly one thousand soundings were taken in Loch Tay, and the maximum depth observed was 508 feet. The maximum depth recorded by Mr. Grant-Wilson in 1888, when he took 415 soundings in Loch Tay, was 85 fathoms, or 510 feet. The volume of water contained in the loch is estimated at 56,549,745,000 cubic feet, or over one-third of a cubic mile, and the mean depth at 199 feet, or 39 per cent. of the maximum depth. The length of the loch is 15·1 times the maximum depth, and 386 times the mean depth.

Loch Tay trends in a north-east and south-west direction, being slightly sinuous in outline, somewhat like the italic letter *f*, as was noted in the case of Loch Iubhair, which flows into it. It is extremely simple in conformation, the bottom sloping gradually, without any pronounced irregularities, on all sides down to the deepest part, as is well shown on the longitudinal and cross sections on the map. The 50-feet basin approaches to within less than 400 feet from the south-west end, and less than 800 feet from the north-east end, and is 14⅓ miles in length. The slope of the bottom is thus steeper at the south-west end than at the north-east end. In the former position a sounding of 65 feet was taken about 750 feet from shore, giving a gradient of 1 in 11½, and in the latter position a sounding of 80 feet was taken about 1075 feet from shore, giving a gradient of 1 in 13½. The 100-feet basin extends from about a quarter of a mile from the south-west end to about one-third of a mile from the north-east end, and is very nearly 14 miles in length. The 200-feet

basin stretches from about $1\frac{1}{4}$ miles from the north-east end to about $2\frac{1}{5}$ miles from the south-west end, and is about 11 miles in length. The main 300-feet basin approaches to within less than 2 miles from the north-east end, and is over $7\frac{1}{2}$ miles in length; it is separated, by a slight shoaling of the bottom over an interval of about a mile, from a small subsidiary 300-feet basin (based upon soundings of 301 and 305 feet), which is over half a mile in length. The 400-feet basin is over $3\frac{1}{2}$ miles in length, lying in the northern half of the loch, and approaching to about $3\frac{1}{2}$ miles from the north-east end. The deepest part of the loch lies between Skiag on the south-eastern shore and Cragganruar on the

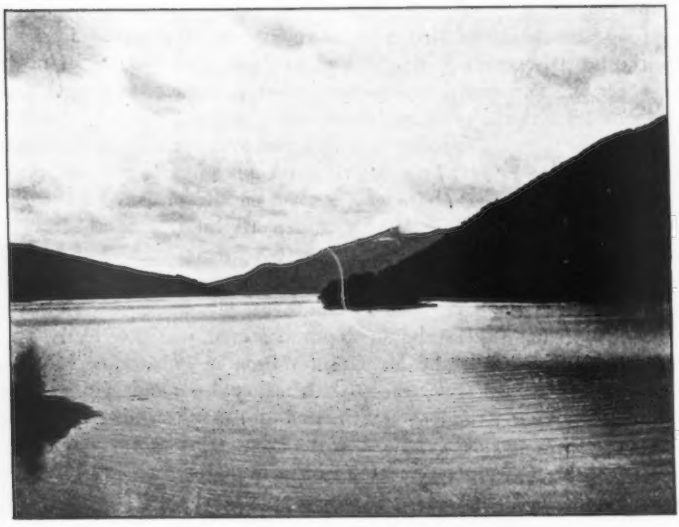

FIG. 3.—LOCH TAY, FROM KENMORE BRIDGE.
(*Photo by T. N. Johnston, M.B., C.M.*)

north-western shore, about $5\frac{1}{2}$ miles from the north-east end of the loch, or about 6 miles by road from Kenmore, where there is a small basin over 500 feet in depth, two soundings of 508 feet being recorded about midway between the two shores.

The area of the lake-floor covered by less than 100 feet of water is estimated at about 1972 acres (over 3 square miles), or over 30 per cent. of the total area of the loch; the area between the 100-feet and 200-feet contour-lines is about 1532 acres (nearly $2\frac{1}{2}$ square miles), or $23\frac{1}{2}$ per cent.; the area between the 200-feet and 300-feet contours is about 1390 acres (over 2 square miles), or over 21 per cent.; the area between the 300-feet and 400-feet contours is about 1017 acres (over $1\frac{1}{2}$ square

miles), or 15½ per cent.; the area between the 400-feet and 500-feet contours is over 600 acres (rather less than 1 square mile), or over 9 per cent.; while the area covered by more than 500 feet of water is about 9 acres, or a small fraction of 1 per cent. of the entire area of the loch. These gradually decreasing areas between the contour-lines drawn in at intervals of 100 feet indicate that the average slope of the bottom becomes steeper and steeper on proceeding from the shore out into deep water; this is also clearly shown by a comparison of the two shallow zones on both sides of the 50-feet contour-line, the area between the shore and the 50-feet line being about 1161 acres, while the area between the 50-feet and 100-feet lines is about 811 acres, or respectively about 18 and 12¾ per cent. of the total area of the loch. The slope of the bottom of the loch is shown on the natural scale and exaggerated five times on the longitudinal and cross sections on the map.

Loch Tay was surveyed on April 29 to May 7, 1902, by Sir John Murray, Dr. Johnston, Messrs. Parsons and James Murray, and the level of the surface of the water was determined by levelling from bench-marks as being 349·1 feet above the sea. The officers of the Ordnance Survey found the level to be 347·9 feet above the sea on August 12, 1899.

Many surface temperatures were taken during the progress of the survey from April 29 to May 7, 1902, the readings varying from 41°·8 Fahr. to 47°·5—a range of 5°·7. The higher readings, as a rule, were taken near shore, and the lower readings towards the centre of the loch over deep water. The air-temperatures taken during the same period varied from 42°·1 to 49°·1—a range of 7°. When visited on May 28, 1903, the surface temperature at noon about a mile from Kenmore was found to be 49°·3.

Two serial temperatures were taken beneath the surface in May, 1902, and one series in May, 1903, as given in the following table:—

SERIAL TEMPERATURES TAKEN IN LOCH TAY.

Depth (feet).	May 1, 1902. Off Ardeonaig.	May 6, 1902. Between Lawers and Fearnan, 4 p.m.	May 28, 1903. 1 mile west of Kenmore, noon.
	° Fahr.	° Fahr.	° Fahr.
0	43·8	42·0	49·3
3	—	—	47·0
5	43·2	42·0	44·5
10	43·2	41·9	44·0
20	42·0	41·9	—
25	—	—	43·1
30	41·9	41·8	—
50	41·7	41·8	42·9
100	41·2	41·7	42·5
150	41·0	—	—
200	40·8	41·2	—
250	40·5	—	—
300	40·3	41·0	—
350	—	41·0	—

It will be seen that on May 1, 1902, the temperature of the water down to 30 feet was higher than on May 6, 1902, while from 50 feet downwards it was lower. The range of temperature between the surface and a depth of 300 feet on May 1 was 3°·5 (from 40°·3 to 43°·8), while on May 6 it was only 1° (from 41° to 42°). On May 28, 1903, the temperature of the water was found to be considerably higher from the surface down to a depth of 100 feet than was observed in the previous May, the range of temperature in the upper 100 feet of water being 6°·8 (from 42°·5 to 49°·3).

9. *Some of the Smaller Lochs of the Tay Basin.*

*Loch Derculich.**—Loch Derculich, situated in Strathtay amid beautiful scenery, affords good fishing, but is strictly preserved; it flows by the Derculich burn into the river Tay to the north-east of Aberfeldy. It is surrounded by low rounded hills covered with heather, and there are few conspicuous boulders, but many small ones. To the north are high, steep hills (Farragon, etc.), with grey screes. The knoll forming the point at the boathouse on the south-eastern shore is high and planted with trees. The burn flows out of the loch by an artificial dam and sluice, which was open on the date of the survey, and the water in the loch was very low, a long gravelly point (not shown on the Ordnance Survey chart) appearing, and the island to the north was nearly, while the island to the south was quite, joined to the shore. Loch Derculich (pronounced Der'clich) is over half a mile in length from north to south, and also in maximum breadth from east to west, the mean breadth being over a quarter of a mile, or 45 per cent. of the length. Its waters cover an area of over 100 acres, or about one-sixth of a square mile, and it drains an area ten times greater—over $1\frac{1}{2}$ square miles. About sixty soundings were taken, the maximum depth observed being 70 feet. The volume of water is estimated at 108,333,000 cubic feet, and the mean depth at nearly 25 feet, or 35 per cent. of the maximum depth. The length of the loch is 44 times the maximum depth and 126 times the mean depth. A ridge crosses the loch at the narrowest part near the middle, the greatest depth on which is 34 feet. On both sides of this ridge the water deepens, the maximum depth in the southern basin being 45 feet, while the main deep basin lies to the north of the ridge, the maximum depth of the loch (70 feet) having been found less than a quarter of a mile from the north-eastern angle of the loch, where there is a small 50-feet basin about one-tenth of a mile in length; a short distance to the north-east is an isolated sounding of 50 feet, comparatively close to the north-east shore, separated from the 50-feet basin by a sounding of 38 feet. The 25-feet basin is a continuous area half a mile in length and over a quarter of a mile in breadth. The area

* = Loch of the great divers (the birds).

of the lake-floor covered by less than 25 feet of water is about 53½ acres; that covered by water between 25 and 50 feet in depth is about 44½ acres; while that covered by more than 50 feet of water is about 2½ acres. Loch Derculich was surveyed on May 27, 1903, by Mr. James Murray; the elevation above the sea could not be determined. A series of temperatures was taken in the deepest part of the loch at 8 p.m. on May 27, 1903, with the following results: —

Surface	... ...	55°·0 Fahr.
10 feet	... ...	51°·0 „
15 „	... ...	49°·0 „
25 „	... ...	47°·7 „
50 „	... ...	47°·1 „
65 „	... ...	47°·0 „
70 „	... ...	47°·0 „

(the air-temperature at the time being 51°·0)

The range of temperature from surface to bottom was 8°·0, there being a fall of 4°·0 between the surface and a depth of 10 feet, and a further fall of 3°·3 between 10 and 25 feet. A comparison of these temperatures with those taken in Lochs Daimh and Giorra on the previous day shows that the water in Loch Derculich was much warmer from surface to bottom than in the two lochs referred to: at the surface the temperature was about 5°, and at 10 feet 3° to 4° higher; at the bottom it was 4° higher than at the bottom of Loch Daimh, and 1° higher than at the bottom of Loch Giorra at a much less depth.

A short distance to the south-west of Loch Derculich lies Loch Glassie,* a small hill loch containing pike, which also flows into the river Tay near the entrance of the Derculich burn. To the north-west of Loch Derculich lies Lochan a' Chait,† a little lochan which flows in the opposite direction into Loch Tummel.

Loch Scoly.—Loch Scoly, a small hill loch in Strathtay, lying to the north-east of Loch Kennard and west of Loch Skiach, and flowing by the Balnaguard burn into the river Tay shortly before its junction with the river Tummel, is over a quarter of a mile in length, with a maximum breadth of about one-eighth of a mile, the mean breadth being about one-sixteenth of a mile, or 21 per cent. of the length. Its waters cover an area of about 11½ acres, and it drains an area 13 times greater, or about a quarter of a square mile. Twenty-five soundings were taken, the maximum depth observed being 12 feet. The volume of water is estimated at 2,888,000 cubic feet, and the mean depth at nearly 5¾ feet, or 48 per cent. of the maximum depth. The length of the loch is 123 times the maximum depth, and 258 times the mean depth. The loch forms a simple basin; the deeper water is

* = Loch of the green meadows. † = Loch of the cat.

found towards the southern end, the three soundings exceeding 10 feet being centrally placed in the southern half of the loch. Only three soundings were taken under 5 feet close to the shore, so that the slope of the bottom is on the whole moderately steep. The area of the lake-floor covered by less than 10 feet of water is over 10 acres, or 88 per cent. of the total area of the loch, and only a small proportion of this area is covered by less than 5 feet of water. Loch Scoly was surveyed on May 29, 1903, by Mr. James Murray. The temperature of the surface water was 63°·0 Fahr., and a reading at 5 feet gave the same result, while a reading at 10 feet gave 56°·0—a fall of 7°·0 in the temperature of the water at 10 feet as compared with that at 5 feet.

Loch Ordie.—Loch Ordie is a very pretty loch situated amid grouse-moors to the east of the river Tay, and surrounded by wooded hills; it is a good trouting loch, but strictly preserved. It receives the outflow from two little lochs lying among the hills to the north—Lochan Oisinneach Bheag* and Lochan Oisinnic Mhor†—and flows into the river Tay near Dalguise. It trends in an east and west direction, being widest towards the west end, and narrowing somewhat towards the east end. It is nearly two-thirds of a mile in length, and nearly half a mile in maximum breadth, the mean breadth being over a quarter of a mile, or 44 per cent. of the length. Its waters cover an area of about 116 acres, or nearly one-fifth of a square mile, and it drains an area nearly 24 times greater—over $4\frac{1}{4}$ square miles. Sixty-five soundings were taken, the maximum depth observed being 69 feet. The volume of water is estimated at 133,110,000 cubic feet, and the mean depth at $26\frac{1}{3}$ feet, or 38 per cent. of the maximum depth. The length of the loch is 49 times the maximum depth, and 128 times the mean depth. Loch Ordie is extremely simple in conformation, the bottom sinking gradually on all sides down to the greatest depth, which is approximately centrally placed, though rather nearer the west than the east end. The 25-feet basin is about two-fifths of a mile in length, and over a quarter of a mile in maximum width, while the 50-feet basin is about a quarter of a mile in length, and one-seventh of a mile in maximum width. The area of the lake-floor covered by less than 25 feet of water is about 66 acres, or 57 per cent. of the total area of the loch; that covered by water between 25 and 50 feet in depth is about 34 acres, or 29 per cent.; while that covered by over 50 feet of water is about 16 acres, or 14 per cent. of the entire area of the loch. Loch Ordie was surveyed on June 3, 1903, by Mr. James Murray, and the level of the surface of the water was determined by levelling from bench-mark as being 946·3 feet above the sea. Serial temperatures taken in the deepest part of the loch gave the following results:—

* = The little cornered loch (*i.e.* having bays or nooks).
† = The big cornered loch (*i.e.* having bays or nooks).

Surface	... ...	57°·6 Fahr.
10 feet	... ...	55°·3 „
15 „	... ...	49°·5 „
25 „	... ...	47°·1 „
50 „	... ...	45°·7 „
68 „	... ...	45°·4 „

The range of temperature from surface to bottom was 12°·2, there being a fall of 5°·8 between 10 and 15 feet.

*Loch na Craige.**—Loch na Craige (or na-Craig), one of the best trout lochs in the district, is situated in Strathtay about 3 miles to the south-east of Aberfeldy, and flows into the river Bran by the Cochill burn, which also receives the outflow from Loch Hoil. It is surrounded by low, heather-clad hills covered with stony *debris*. It is nearly half a mile in length, nearly one-eighth of a mile in maximum breadth, the mean breadth being about one-twelfth of a mile, or 16 per cent. of the length. The waters of the loch cover an area of about 24 acres, and it drains an area fourteen times greater, or more than half a square mile. Nearly thirty soundings were taken, the maximum depth observed being 13 feet. The volume of water is estimated at 7,871,000 cubic feet, and the mean depth at nearly 7½ feet, or 57 per cent. of the maximum depth. The length of the loch is 195 times the maximum depth, and 342 times the mean depth. Loch na Craige is a long, narrow depression trending in a north-west and south-east direction, or nearly north and south. It forms a simple basin, the deep water running along the centre of the loch, the area covered by more than 10 feet of water being over one-third of a mile in length, but it is rather curious to note that the maximum depth of 13 feet was found at the extreme southern end of the 10-feet basin and comparatively very close to the southern shore. The slope of the bottom is thus pretty steep here, and in other places the slope is steep; for instance, two soundings of 11 feet were taken about 60 feet from shore, one off the western and one off the eastern shore, giving a slope of 1 in 5·5. About 63 per cent. of the lake-floor, or about 15¼ acres, is covered by less than 10 feet of water. Loch na Craige was surveyed on May 29, 1903, by Mr. James Murray, who determined the elevation of the surface of the water by levelling from bench-mark as being 1297·3 above the sea. Temperatures were taken in the deepest part of the loch, with the following results :—

Surface	... ...	60°·0 Fahr.
5 feet	... ...	60°·0 „
10 „	... ...	56°·5 „

(the air-temperature at the time being 63°·0)

Loch Kennard.†—Loch Kennard, a good fishing loch abounding with small trout, is situated in Strathtay, and flows into the river Bran by

* = Loch of the rock.

† Loch of the high point.

the Ballinloan burn. Its shores are nearly all wooded, and where not planted with trees the low hills are covered with heather. It is peculiar in outline, somewhat resembling that of a young mushroom, the stem pointing west and the apex of the crown pointing north-west. It is over two-thirds of a mile in length, and over one-third of a mile in maximum breadth, the mean breadth being over one-sixth of a mile, or 26 per cent. of the length. Its waters cover an area of about 77 acres, or nearly one-eighth of a square mile, and it drains an area seven times greater, or nearly nine-tenths of a square mile. Nearly fifty soundings were taken, the maximum depth observed being 72 feet. The volume of water is estimated at 108,439,000 cubic feet, and the mean depth at 32¼ feet, or 45 per cent. of the maximum depth. The length of the loch is 50 times the maximum depth and 111 times the mean depth. Loch Kennard forms a simple basin, with here and there minor undulations of the bottom. The deepest water (72 feet) is found in the centre of the widest part of the loch, to the east of the constriction in its outline; in the middle of this constriction a depth of 70 feet was found, but immediately to the west the bottom rises to 50 feet beneath the surface, and falls again farther west to a depth of 63 feet. The 25-feet basin is half a mile in length and over a quarter of a mile in maximum width, while the 50-feet basin is over one-third of a mile in length. The area of the lake-floor covered by less than 25 feet of water is nearly 30 acres, or 38 per cent. of the entire area of the loch; that covered by water between 25 and 50 feet in depth is about 33 acres, or 43 per cent.; while that covered by more than 50 feet of water is over 14 acres, or 19 per cent. of the total area of the loch. These figures show that the average slope is steeper between the shore and the 25-feet contour-line than between the 25-feet and 50-feet contours. Loch Kennard was surveyed on May 29, 1903, by Mr. James Murray, who was unable to determine the elevation of the surface of the water above the sea. Temperatures were taken in the deepest part of the loch, with the following results:—

Surface	...	...	...	...	...	...	...	56°·7 Fahr.
5 feet	...	...	...	...	...	...	...	51°·0 „
10 „	...	...	...	...	...	...	...	48°·3 „
25 „	...	...	...	...	...	...	...	46°·0 „
50 „	...	...	...	...	...	...	...	45°·5 „
72 „	...	...	...	...	...	...	...	45°·3 „

(the air-temperature at the time being 60°·0)

The range in the temperature of the water from surface to bottom was thus 11°·4, the fall of temperature between the surface and a depth of 5 feet amounting to 5°·7, that between 5 and 10 feet amounting to 2°·7, and that between 10 and 25 feet to 2°·3. A comparison of these temperatures with those taken in Loch Derculich two days previously shows that the temperature of the whole body of water in Loch Kennard was

lower than that in Loch Derculich (except at the surface—which may be due to the fact that the observations in Loch Kennard were made in the early afternoon, while those in Loch Derculich were taken in the late evening).

*Loch Skiach.**—Loch Skiach, situated in Strathtay, containing large trout as well as pike, flows into Little Loch Skiach (which was not sounded) by a short burn with a slight fall, and thence by the Pitleoch burn into the Ballinloan burn shortly before it joins the river Bran. It is surrounded by low rounded, heather-clad hills with scattered boulders, and the shores are of clean shingle with boulders. It is very irregular in outline, the longer axis being nearly north and south, and the bottom is also irregular. It is over three-quarters of a mile in length, and nearly half a mile in maximum breadth, the mean breadth being nearly one-fifth of a mile, or 25 per cent. of the length. Its waters cover an area of about 98 acres, or over one-seventh of a square mile, and it drains an area six times greater—an area of nearly one square mile. Eighty-five soundings were taken in Loch Skiach, the maximum depth observed being 55 feet. The volume of water is estimated at 77,185,000 cubic feet, and the mean depth at 18 feet, or 33 per cent. of the maximum depth. The length of the loch is 75 times the maximum depth, and 228 times the mean depth. Near the middle a ridge crosses the loch from south-east to north-west, on which the depth is less than 20 feet; this ridge separates the two deep basins, of which the southerly one is the deeper, the maximum depth of 55 feet having been recorded about a quarter of a mile from the southern end of the loch, while the greatest depth recorded in the northern basin was 45 feet in two places. The two 25-feet basins are each under a quarter of a mile in length. Near the middle of the loch the slope of the bottom is very steep in places; for instance, a sounding of 33 feet was taken off the eastern shore at a distance of about 100 feet, giving a slope of 1 in 3, and a sounding of 26 feet about the same distance off the western shore gives a slope of 1 in 3·8. The area of the lake-floor covered by less than 25 feet of water is about 77 acres, or 79 per cent. of the total area of the loch; that covered by water between 25 and 50 feet in depth is about 20 acres, or 20 per cent.; while that covered by more than 50 feet of water is only about 1½ acres, or 1 per cent. Loch Skiach was surveyed on June 12, 1903, by Mr. James Murray, and the level of the surface of the water was determined by levelling from bench-mark as being 1385·7 feet above the sea. The temperature of the surface water on commencing the survey at 9 a.m. on June 12, 1903, was 59°·0 Fahr. (the air-temperature at the time being 53°·0). Later in the day serial temperatures were taken in the deepest part of the loch, with the following results :—

* = Loch of thorns.

Surface	...	...	...	...	...	...	60·0°	Fahr.
10 feet	...	...	...	...	...	...	59·0°	„
15 „	...	...	...	...	...	...	55·3°	„
20 „	...	...	...	...	...	...	49·2°	„
30 „	...	...	...	...	...	...	49·0°	„
45 „	...	...	...	...	...	...	48·0°	„
55 „	...	...	...	...	...	...	47·5°	„

The range in the temperature of the water from surface to bottom was thus 12°·5; between the surface and a depth of 10 feet the fall was only 1°, but between the depths of 10 and 20 feet the fall of temperature amounted to nearly 10°,—3°·7 between 10 and 15 feet, and 6°·1 between 15 and 20 feet. These readings are all higher than those taken in Lochs Kennard and Derculich about a fortnight earlier in the season.

Loch Broom.—Loch Broom, a fine trout loch, but strictly preserved, lies to the east of the river Tummel, into which it flows by the Lochbroom burn to the north of Ballinluig, before the river Tummel joins the river Tay. It is nearly three-quarters of a mile in length, and over one-third of a mile in maximum breadth, the mean breadth being nearly one-fifth of a mile. Its waters cover an area of about 86 acres, or over one-eighth of a square mile, and it drains an area of $3\frac{1}{2}$ square miles—an area twenty-six times greater than the area of the loch. Over sixty soundings were taken in Loch Broom, the maximum depth observed being 9 feet. The volume of water contained in the loch is estimated at 18,813,000 cubic feet, and the mean depth at 5 feet, or 56 per cent. of the maximum depth. The length of the loch is 422 times the maximum depth, and 757 times the mean depth.

Loch Broom is very shallow, being simply a large bog-hole, or depression in the moorland, with shores of yellow sandy *débris* covered by peat, and all heather-clad. The outflow is over a dam about 5 feet high, so that the greater part of the loch must be artificial. Where the depth is less than 5 feet the bog-bean is everywhere seen, and there are numerous islets—some of peat, others chiefly of bog-bean—on several of which gulls nest. The deeper water (over 5 feet) lies to the east and north of the islets, the maximum depth of 9 feet having been observed in several places towards the eastern shore; along the western shore and around the islets the bottom is covered by less than 5 feet of water, but at the outflow, where the waters of the loch pass into Lochbroom burn, two soundings of 5 feet were taken. The area of the lake-floor covered by less than 5 feet of water is about 38 acres, or 44 per cent. of the entire area of the loch, while that covered by more than 5 feet of water is about 48 acres, or 56 per cent. Loch Broom was surveyed on June 11, 1903, by Mr. James Murray, but the elevation above the sea could not be determined. Drift-marks were observed 3 feet above the level of the water on the date surveyed.

The temperature of the surface water on commencing the survey at

noon on June 11, 1903, was 60°·0 Fahr., and two readings in open water —one at the surface and one at a depth of 8 feet—gave in each case 60°·8 (the air-temperature being 51°).

*Loch Essan.**—Loch Easan (or Easain), a hill loch lying to the north of Loch Dochart, containing dark-coloured trout of rare quality, but strictly preserved, flows by the Allt Essan into the river Dochart after it leaves Loch Iubhair. It is nearly half a mile in length, and over one-fifth of a mile in maximum breadth, the mean breadth being about one-ninth of a mile. Its waters cover an area of about 32 acres, and it drains an area of over 1½ square miles—an area thirty-two times greater than the area of the loch. Over forty soundings were taken in Loch Essan, the maximum depth observed being 18 feet. The volume of water is estimated at 9,664,000 cubic feet, and the mean depth at nearly 7 feet, or 38 per cent. of the maximum depth. The length of the loch is 135 times the maximum depth, and 356 times the mean depth. The loch trends in an east and west direction, and is very irregular in outline. The bottom is also irregular, forming three small basins with depths exceeding 10 feet, the westernmost being the deepest, the maximum depth of 18 feet having been observed about one-sixth of a mile from the west end of the loch. To the east of this western deep basin, and near the centre of the loch, lies a heap of stones around which soundings of 6 feet were taken. A little farther to the east lies the central 10-feet basin, based on a sounding of 11 feet. To the east of the central basin there is a constriction in the outline of the loch in which soundings of 7 and 8 feet were taken, and on approaching the east end the loch widens out, and the bottom sinks to form the third (eastern) 10-feet basin, the maximum depth in which is 16 feet. To the south of this eastern basin is a small island, the passage between the island and the shore being obstructed by weeds, and weeds are also abundant along the northern shore. The area of the lake-floor covered by less than 10 feet of water is about 26 acres, or 81 per cent. of the total area of the loch, while that covered by more than 10 feet of water is about 6 acres, or 19 per cent. Loch Essan was surveyed on June 16, 1903, by Mr. James Murray, who estimated the elevation of the surface of the water as being about 1440 feet above sea-level.

About half a mile to the south-west of Loch Essan lies the little Loch Maragan, which flows by the Allt Inverhaggernie in the river Fillan before it enters Loch Dochart.

Lochan Breaclaich.†—Lochan Breaclaich (or Loch-an-Breacklaich), a hill loch containing fine trout, flows into Loch Tay near its south-west end by the Allt na Breaclaich. It is peculiar in outline, somewhat resembling the capital letter Y, a promontory of land projecting into the loch from the eastern shore opposite the inlet on the western shore

* = Loch of the waterfalls. † = Speckled loch.

which leads to the outflow. The length of the loch from north-east to south-west in a straight line is about half a mile, but a line following the axis of deep water would be considerably over half a mile in length. The maximum breadth is about one-third of a mile, and the mean breadth about one-seventh of a mile. Its waters cover an area of about 43 acres, and it drains an area twenty times greater, or about $1\frac{1}{3}$ square miles. About sixty soundings were taken in Lochan Breaclaich, the maximum depth observed being 41 feet. The volume of water is estimated at 26,619,000 cubic feet, and the mean depth at 14 feet, or 34 per cent. of the maximum depth. The length of the loch is 64 times the maximum depth, and 187 times the mean depth. The bottom of the loch is fairly regular, sinking, to the north and south of the promontory referred to, into two basins with depths exceeding 25 feet, occupying the arms, as it were, of the letter Y, while the shank of the letter, leading to the outflow, is occupied by shallower water. Of the two deep basins the northern one is the larger and deeper, the maximum depth of 41 feet having been found approximately in the centre of this basin, but towards the north-western shore, while the southern basin is based upon soundings of 32 and 26 feet. The 10-feet basin is a continuous area extending from close to the north-eastern end to near the south-western end, and occupying the greater portion of the loch. The area of the lake-floor covered by less than 10 feet of water is over 19 acres, or 45 per cent. of the total area of the loch, while that covered by more than 10 feet of water is nearly 24 acres, or 55 per cent. Lochan Breaclaich was surveyed on June 16, 1903, by Mr. James Murray, but the elevation of its surface above the sea could not be determined.

The temperature of the surface water on commencing the survey at 2 p.m. on June 16, 1903, was 57°·0 Fahr. (the air-temperature being 58°·0). Serial temperatures taken in the deepest part of the loch gave the following results:—

Surface	...	...	...	...	...	...	...	57°·5 Fahr.
5 feet	...	...	...	...	...	...	...	57°·5 „
10 „	...	...	...	...	...	...	...	57°·4 „
15 „	...	...	...	...	...	...	...	51°·2 „
20 „	...	...	...	...	...	...	...	49°·3 „
40 „	...	...	...	...	...	...	...	48°·0 „

It will be observed that the range of temperature from surface to bottom amounted to 9°·5, and that the fall of temperature between the depths of 10 and 15 feet amounted to 6°·2.

*Lochan na Lairige.**—Lochan na Lairige lies to the west of Ben Lawers, and flows into Loch Tay by the Allt a' Mhoirneas, which enters the loch nearly opposite the entrance of the Allt na Breaclaich. It trends in a north and south direction, and is extremely simple in outline and

* = Loch of the homestead.

conformation; it is oblong in outline, and of nearly uniform width throughout. It is nearly three-quarters of a mile in length, and over one-eighth of a mile in maximum breadth, the mean breadth being one-tenth of a mile, or 14 per cent. of the length. Its waters cover an area of abou 47½ acres, and it drains an area 16 times greater, or about $1\frac{1}{6}$ square miles. Over forty soundings were taken, the maximum depth observed being 39 feet. The volume of water is estimated at 22,682,000 cubic feet, and the mean depth at 11 feet, or 28 per cent. of the maximum depth. The length of the loch is 99 times the maximum depth, and 350 times the mean depth. The northern portion of the loch is shallow, the water deepening gradually on proceeding southwards until the maximum depth is encountered about one-eighth of a mile from the southern end; thence the water shallows rapidly towards the south end. The 10-feet basin is about half a mile in length, extending from near the south end to within one-sixth of a mile from the north end. The 25-feet basin is contained in the southern half of the loch, and is about a quarter of a mile in length. The area of the lake-floor covered by less than 10 feet of water is over 29 acres, or 62 per cent. of the entire area of the loch, while that covered by more than 10 feet of water is over 18 acres, or 38 per cent., of which 8 per cent. exceeds 25 feet in depth. Lochan na Lairige was surveyed on June 16, 1903, by Mr. James Murray, who estimated that the surface of the water was about 1595 feet above the level of the sea.

To the north-east of Lochan na Lairige lies the little Lochan a' Chait* on the eastern flanks of Ben Lawers; it flows into Loch Tay by the Lawers burn.

Lochs Daimh and Giorra, situated in the wilds of Glenlyon, amid grand and mountainous scenery, are good trouting lochs, but strictly preserved. Loch Daimh flows into Loch Giorra by a short river, and the outflow from both lochs is carried into the river Lyon by the Allt Conait. To the south, on the flanks of Stuchd an Lochain, lies the small (Lochan nan Cat*), at an elevation of over 2000 feet above the sea, which flows into the river between Lochs Daimh and Giorra. It being reported that this little lochan was frozen over a few days before the date of the survey of Lochs Daimh and Giorra, it was visited in the hope of taking soundings through holes in the ice, but the ice had disappeared. It was apparently shallow all round the shore, except where there are screes from the cliffs, and, if at all deep, it must be over a very limited area. The temperature of the water was 53°·0 Fahr. (the air-temperature being 55°·0), while a reading taken close under the crags beside the snow gave 49°·8. Lochs Daimh, Giorra, and nan Cat are sometimes referred to as the Lochs of Roro.

Loch Daimh.†—Loch Daimh (or Damh) trends in an east and west

* = Loch of the cat. † = Loch of the stags.

direction, being widest and deepest towards the west end, narrowing and shallowing towards the east end. It is nearly a mile in length, and nearly one-third of a mile in maximum breadth, the mean breadth being nearly one-fifth of a mile, or 19 per cent. of the length. Its waters cover an area of about 111 acres, or over one-sixth of a square mile, and it drains an area nearly 30 times greater, or over 5 square miles. Nearly sixty soundings were taken, the maximum depth observed being 95 feet. The volume of water is estimated at 189,623,000 cubic feet, and the mean depth at 39 feet, or 41 per cent. of the maximum depth. The length of the loch is 53 times the maximum depth and 130 times the mean depth. The loch is of simple conformation, and, on the whole, comparatively deep, only half a dozen soundings under 10 feet being recorded close to the shore. Off the northern shore, towards the west end, the slope of the bottom is very steep, soundings of 31 feet and 44 feet having been taken about 80 and 100 feet from shore respectively; this is equal to a slope of 1 in 2·3 to 2·6. The eastern end, and south-eastern portion of the loch around the island, are comparatively shallow. The 25-feet basin is about three-quarters of a mile in length, stretching from quite close to the west end to within one-sixth of a mile from the east end. The 50-feet basin is nearly half a mile in length, and the 75-feet basin, occupying the western half of the loch, is over one-third of a mile in length. The maximum depth of 95 feet was observed in two places approximately near the centre of the wide western portion of the loch. The area of the lake-floor covered by less than 25 feet of water is about 50½ acres, or over 45 per cent. of the total area of the loch; that covered by water between 25 and 50 feet in depth is about 21½ acres, or over 19 per cent.; that covered by water between 50 and 75 feet in depth is about 19 acres, or 17 per cent.; and that covered by more than 75 feet of water is about 20½ acres, or over 18 per cent. of the entire area of the loch. The flat-bottomed character of the deep western portion of the loch is well brought out by a comparison of the last two percentages, while the high percentage of the bottom covered by less than 25 feet of water is due to the comparatively large shallow area in the south-eastern and eastern part of the loch.

Loch Daimh was surveyed on May 26, 1903, by Mr. James Murray, but the level of the surface of the water above the sea could not be determined. The temperature of the surface water on commencing the survey at 9.30 a.m. on May 26, 1903, was 51°·0 Fahr. (the air-temperature being 64°·0), and a series of temperatures taken in the deepest part of the loch gave the following results:—

Surface	...	50°·3 Fahr.
10 feet	...	47°·0 „
25 „	...	44°·0 „
50 „	...	43°·5 „
90 „	...	43°·0 „

The range in the temperature of the water from surface to bottom was thus 7°·3. The fall of temperature from the surface to a depth of 10 feet amounted to 3°·3, and that between the depths of 10 and 25 feet amounted to 3°·0, and below 25 feet the fall amounted to 1°·0.

*Loch Giorra.**—Loch Giorra (or Girre) trends almost east and west; there is a slight bend near the middle of the loch, the eastern half trending north-west and south-east. It is over four-fifths of a mile in length, with a maximum breadth of over a quarter of a mile, the mean breadth being about one-sixth of a mile, or 20 per cent. of the length. Its waters cover an area of about 88½ acres, or less than one-seventh of a square mile, and it drains directly an area of over 5½ square miles, but, since it receives the outflow from Loch Daimh, its total drainage area is over 10¾ square miles—an area 78 times greater than the area of the loch. Nearly sixty soundings were taken in Loch Giorra, the maximum depth observed being 49 feet. The volume of water is estimated at 83,686,000 cubic feet, and the mean depth at nearly 22 feet, or 44 per cent. of the maximum depth. The length of the loch is 88 times the maximum depth, and 200 times the mean depth.

The floor of Loch Giorra is rather irregular. The deepest part is in the western half, the maximum depth of 49 feet having been observed about one-sixth of a mile from the west end. The 25-feet basin in this part of the loch is about two-fifths of a mile in length, and towards the east end there is a second 25-feet basin about one-fifth of a mile in length, in which the maximum depth is 40 feet. These two basins are separated by a remarkable rise of the bottom, on which depths of 15 and 18 feet were recorded, surrounded on all sides by deeper water. The area of the lake-floor covered by less than 20 feet of water is nearly 43 acres, or over 48 per cent. of the total area of the loch; that covered by water between 20 and 40 feet in depth is nearly 38 acres, or about 42½ per cent.; while that covered by more than 40 feet of water is over 8 acres, or over 9 per cent. Loch Giorra was surveyed on the same day as Loch Daimh, May 26, 1903, by Mr. James Murray; its elevation above the sea could not be determined. A series of temperatures taken in the deepest part of the loch gave the following results :—

Surface	50°·0 Fahr.
10 feet	48°·0 „
25 „	46°·8 „
45 „	46°·0 „

(the air-temperature at the time being 53°·0)

A comparison of these temperatures with those taken in Loch Daimh later in the day shows that, while the surface temperature in each loch was nearly identical, the temperature of the water beneath the surface was lower in the deeper loch: thus at 10 feet the temperature in Loch

* = Short loch (shorter of two).

SUMMARY TABLE.

Giving Details concerning the Lochs described in this Paper.

Loch.	Height above sea. Feet.	Number of soundings.	Length in miles.	Breadth in miles.		Mean breadth per cent. of length.	Depth.			Ratio of depth to length.		Volume in million cubic feet.	Area in square miles.	Drainage area.	
				Max.	Mean.		Max. feet.	Mean feet.	Mean per cent. of max.	Max.	Mean.			Total in square miles.	Ratio to area of loch.
Tummel	454·5	289	2·75	0·50	0·36	13·1	128	48·030	37·5	113	302	1,317	0·98	306·06	312·31
Tay	349·1	924	14·55	1·07	0·70	4·8	508	199·076	39·2	151	386	56,550	10·19	232·06	22·77
Derculich	—	59	0·59	0·59	0·27	45·1	70	24·717	35·3	44	126	108	0·16	1·57	10·00
Scoly	—	25	0·28	0·12	0·06	21·4	12	5·724	47·7	123	258	3	0·02	0·23	12·77
Ordie	946·3	65	6·64	0·48	0·28	43·8	69	26·324	38·2	49	128	133	0·18	4·28	23·64
Na Craige	1297·3	27	0·48	0·13	0·08	16·5	13	7·420	57·1	195	342	8	0·04	0·54	14·21
Kennard	—	47	0·68	0·36	0·18	26·2	72	32·266	44·8	50	111	108	0·12	0·88	7·27
Skiach	1385·7	85	0·78	0·44	0·20	25·1	55	18·090	32·9	75	228	77	0·15	0·94	6·14
Broom	—	62	0·72	0·34	0·19	26·0	9	5·020	55·8	422	757	19	0·13	3·53	26·34
Essan	1440·0	41	0·46	0·21	0·11	23·7	18	6·820	37·9	135	356	10	0·05	1·60	32·00
Lochan Breaclaich ...	—	59	0·49	0·33	0·14	28·2	41	14·088	34·4	64	187	27	0·07	1·35	19·85
Lochan na Lairige ...	1595·0	43	0·73	0·13	0·10	13·7	39	10·970	28·1	99	351	23	0·07	1·16	15·67
Daimh	—	56	0·96	0·31	0·18	18·8	95	39·117	41·2	53	130	190	0·17	5·13	29·48
Giorra	—	55	0·82	0·26	0·17	20·5	49	21·701	44·3	88	200	84	0·14	10·78	78·10
		1838										58,657	12·47	568·72*	45·60

* It must be remembered that the drainage area of Loch Tay includes the areas draining into Lochan Breaclaich and Lochan na Lairige, and that the Loch Giorra drainage area includes that of Loch Daimh.

Daimh was 1°·0 lower than in Loch Giorra, at 25 feet it was 2°·8 lower, and at 50 feet it was 2°·5 lower than at 45 feet in Loch Giorra.

The particulars regarding the different lochs dealt with in this paper are collected together in the table on p. 540 for convenience of reference and comparison.

From this table it will be seen that in the fourteen lochs under consideration 1838 soundings were taken, and that the aggregate area of the water surface is about 12½ square miles, so that the average number of soundings per square mile of surface is 147. The aggregate volume of water contained in the lochs is estimated at about 58,657 millions of cubic feet. The area drained by these lochs is about 568¾ square miles, or nearly 46 times the area of the lochs.

DR. AND MRS. WORKMAN IN THE HIMALAYAS.*

Dr. William Hunter Workman and Mrs. Fanny Bullock Workman made another expedition to the Karakoram Himalayas during the past summer. The latter part of June they explored the Hoh Lumba glacier lying west of the Hispar glacier to its sources. As in case of the Choga Lungma, they found the course of this glacier quite different from that laid down on the Indian Trigonometrical Survey map. At about the middle point of its length, the glacier divides into two branches of similar size and length separated by a high mountain wall. The map shows the westerly of these to run through to join the Hispar glacier. In reality it ends in a snow col 18,600 feet high, surmounted by a tremendous cornice overhanging a precipice 6000 to 7000 feet sheer on the north-east side. An inaccessible icefall leads from the glacier to the col. Dr. and Mrs. Workman and guides ascended this col by the only available route. They crossed a large Bergschrund and traversed a succession of ice-slopes of 60° incline lying on the shoulder of a mountain just above a high precipice, which could only be passed by those thoroughly equipped for mountain work. Directly beneath the col runs a narrow glacier converging upon the Hispar glacier, which it probably joins west of the Zong La, although the junction could not be seen from the col. The other branch, called the Sosbon, ends in a similar col of about the same height, with cornice and precipice falling to the same narrow glacier. The approach to this up a rather steep slope directly from the glacier is easier than to the other col except for the soft snow, which near the top was waist-high. A high mountain ridge separates the narrow

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* Communicated by Dr. Hunter Workman.

glacier from the Hispar. The whole Hoh Lumba glacier, as well as all the mountain flanks, was covered deeply with snow left by the storms of the severe and late winter, and all camps had to be made in the soft snow, which concealed ice, moraine, and rock from sight. With the exception of two days, the weather was stormy. A large branch glacier runs west from the Hoh Lumba near its end, terminating in three smaller branches, and opposite a small branch runs south-east; a small branch also runs west from the point of bifurcation of the Hoh Lumba. There are no other branches, the glacier being fed by hanging glaciers on the sides of its enclosing mountains, which are marvellously beautiful in form and impressive in size.

In July the party again ascended the Chogo Lungma to the base camp of 1902, at 14000 feet on a rock promontory projecting into the glacier at the junction with it of the Haramosh glacier. Here they were detained by storms till the first week in August. The last week of July, during a lull in the stormy weather, they explored the upper branch of the Chogo Lungma, which, leaving it about 3 miles from its origin, runs west-south-west for about 12 miles. This glacier, which is as large as the Haramosh, breaks into the Chogo Lungma in a series of icefalls and seracs. Above these are high snowfields with large crevasses, which are swept by avalanches from the mountains on both sides, making the passage of the glacier dangerous. The snowfields ascend to a snow col 19,000 feet high, beyond which the valleys slope away towards Gilgit. The snow was soft and deep, and snow-shoes were used with advantage. The snow, which froze during the night, softened under the burning sun by 9 o'clock a.m., so that the coolies sank in knee-deep, and camps had to be made by 10 o'clock, which made progress slow.

In August the weather improved. Dr. and Mrs. Workman immediately started with Mummery tents and light camp outfit to attempt the ascent of one or more of three high snow-peaks crowning a boundary wall of the Chogo Lungma. The first camp was made on a side glacier in snow at the base of the slopes of the first peak at a height of 16,200 feet. The second was on a small snow plateau at a height of 18,600 feet. From here an attempt was made to establish a third camp at a height of over 20,000 feet, so that the highest of the three peaks measured by the Indian Survey at 24,486 feet might be attacked with a chance of success, but many of the coolies, who can always be depended on to fail at important crises, were prostrated by mountain sickness, and the third camp had to be pitched at the base of the first and lowest peak at 19,355 feet, and the final ascents carried out from here. At 3 o'clock a.m., with a temperature of 15° Fahr., by the light of a waning moon, Dr. and Mrs. Workman, two guides, and a porter started to ascend the first peak. The snow-slopes were so sharp (60° to 70°) that the entire ascent had to be made in zigzags and

by traversing. At 7 a.m. the summit, a snow-cornice 21,770 feet, was reached. Here readings of hypsometer, barometer, and thermometer were taken, after which a descent of several hundred feet was made to a snow arête leading to the second peak. This was traversed, and the ascent of the second peak was accomplished in soft snow ankle-deep. Its top, 22,567 feet, was gained at 10 a.m.

The party had now performed seven hours of fatiguing work at a high altitude, and it was manifestly impossible to reach the summit of the third peak (24,486 feet) on that day. To scale this, a high camp would have to be made on the plateau leading to it at 22,000 feet, which with coolies would be an impossibility, and, if possible, would be a hazardous experiment in the variable climate of this region. The sharp peak loomed up ahead above the ascending plateau. Upon its south-west arête was a point nearly a thousand feet higher, which evidently commanded a view towards Nagar, which it was desirable to obtain. Mrs. Bullock Workman and the porter remained on the second summit, whilst Dr. Workman and the two guides descended to the plateau, crossed it, and after a stiff scramble up the steep slants of the peak, reached the desired point on the arête at 12.30 p.m. Calculations based on the hypsometric and barometric readings here taken, and those taken at the same hour of the Government mercurial barometer at Skardo (average of calculations by three different tables), place the height attained at 23,394 feet, 311 feet higher than the summit of Aconcagua.

The view from here, as from the two lower peaks, was indescribably grand. Among the countless thousands of spires, wedges, and corners on every side, rose to the south-east the giant peaks of the Biafo, the Mustagh Tower, Masherbrum, Gusherbrum, and the sharp pyramid of K_2, nearly destitute of snow, towering far above all surrounding peaks and ridges. On the south, Haramosh and the immense mass of Nanga Parbat formed a fitting background to other beautiful and majestic mountains more to the front. Directly beneath lay the Chogo Lungma, with its winding moraines visible throughout nearly its whole length; also its last 12-mile branch leading straight away to its snowy col, beyond which valleys stretch towards Gilgit. From the Pertab Singh La, at the head of the Chogo Lungma, a large glacier falls away between massive mountains into a valley which runs directly towards Nagar. Opposite, on the other side of the Chogo Lungma, stands a beautiful snow-needle, measured by the Indian Survey at 22,810 feet, upon whose summit the party could look down. Camp was reached at 6 p.m. The next morning the barometers had fallen; clouds were rising on the horizon. A retreat to the base camp was made, but the storm burst before it was reached. The whole five days' work was done on ice and snow.

From the Chogo Lungma the Balucho Nulla, a side valley, was explored, the lower half of which is covered with large rough moraines,

left by the dying and receding glacier. A large glacier still dominates the upper half. Near its head a snow pass 17,000 feet high, leading over to the Kero Lungma, was discovered and crossed. A cornice had to be cut through, and the descent made by a snow wall of 70° 1000 feet high, gullied by avalanches.

The Hulcho Alchori glacier, the largest branch of the Kero Lungma, was next explored to its sources. This glacier is also wrongly defined on the survey map. Its course is more to the north than the map shows, and at its upper end it divides into three branches running about north-north-east, north, and north-north-west respectively. The glacier proper follows the north-north-east branch. This ends in an icefall, up which a passage could be found at one point only. Above this is a steep col of rock and snow, 18,200 feet high, from which an inaccessible precipice falls almost upon the Hispar glacier. Passages to the Hispar were sought throughout this region, but only at four points were cols found that could be scaled from the south-west side, and the descent from all these towards the Hispar is by precipices. The Mushik La appears to be the only practicable passage to Nagar from this region. The branches of the Hispar on the north are much longer and less steep than from the south.

The expedition was accompanied by the guides J. Petigax and C. Savoie, who accompanied the Duke of Abruzzi on his polar expedition, and porter L. Petigax, all of Courmayeur; also by Mr. B. Hewett, of London, as surveyor. Hypsometric, barometric, and thermometric readings were taken at all points, and readings were also taken three times daily by the official in charge of the Government station at Skardo for the determination of heights. Readings were also taken with solar thermometer. Above 13,000 feet the temperature of the sun's rays was found to average considerably higher than in the torrid Indian plain. Readings at an altitude of over 17,000 feet were obtained as high as 204° Fahr. Measurements were made by Mr. Hewett to determine distances, heights, and movement of glaciers. Many photographs were secured.

GEOGRAPHY AT THE BRITISH ASSOCIATION MEETING AT SOUTHPORT.

Under the energetic command of Captain Creak, the work of the Geographical Section was carried out with much precision and heartiness. The captain's own address was the only one which surveyed the World as a whole, and he directed our attention to the subtle magnetic properties with which he is so familiar. In this presidential address he showed how important the Antarctic expeditions were in securing reliable magnetic observations which would have a great practical as well as theoretic value.

The account of the National Antarctic Expedition was given by Lieut. Shackleton, and the main facts have already appeared in the *Geographical Journal*. This gives no idea of the vivid and racy description of the life of the explorers with which the gallant lieutenant delighted a large audience. Equally effective were Dr. Tempest Anderson's descriptions and views of St. Vincent and Martinique, and of the volcanic activity and destruction of which they have been the theatres. The gist of his communication is published in the March number of the *Geographical Journal*. Lieut.-Colonel Manifold took us across China, from Yunnan to Peking down the Yangtse and back across the land-route farther to the north through Sechwan. His paper, in an extended form, will at a later date be published in the *Geographical Journal*. Dr. H. O. Forbes read a report on his expedition to Sokotra, the results of which are now being published by the Liverpool Museum. Mr. Lomas, who has been working at some of the material brought back by Prof. Herdman from Ceylon, described the physical features of Adam's Bridge. Dr. J. P. Thompson was unfortunately prevented from being present, but his paper, dealing with all aspects of the geography of Queensland, was read by the recorder.

The only African paper was that by Mr. E. D. Morel on the "Economic Development of West Africa." He pointed out that there are urgent reasons why a manufacturing nation like ours should show keener interest in one of the greatest raw material producing countries in the world, of which we possess some 700,000 square miles, inhabited by 30,000,000 people. The extent of British commercial interests in West Africa was commonly ignored, and the future potentialities of the country insufficiently appreciated. The chief factor which determined the Powers to assume the liabilities they have incurred in tropical Africa was the belief that raw material was necessary to an industrial and manufacturing nation, and that each nation must find new markets for the consumption of home manufactures, markets which would pay for such manufactures in raw material. The economic development of tropical Africa was therefore the principal aim which each Power had in view. How could that economic development be best pursued in a manner profitable to the people of Europe and to the people of Africa? If it was to be permanently successful it must be profitable to both.

He pointed out that two antagonistic plans were before the world, which might be defined as Coercion and Commerce. The former he characterized as a revival in an aggravated form of the old culture system of the Dutch East Indies, which had to be abandoned owing to the ruin and exhaustion it brought with it. It was at present in operation in a large portion of tropical Africa. It tended towards the enslavement of whole peoples, and brought inevitable ruin in its train. He argued that, apart from its moral side, this conception was antagonistic to the development of all legitimate European aims in tropical Africa, and was practically short sighted and injurious.

The other conception had, notwithstanding many material obstacles, produced results which were already obvious and visible to all. It was based upon the recognition that the inherent rights of a native of tropical Africa to his land and the produce thereof were the necessary accompaniments of all successful and permanent development work in the interests both of the European and the Negro. The commercial instincts of the Negro were notorious, and his adaptability remarkable. The theory that he will not work was untenable in face of the positive results of his labours in the millions of pounds' worth of produce shipped home annually to Europe from West Africa. He merely required instruction and guidance to prevent wastage and destruction of economic products due to want of knowledge in the preparation and collection of the raw material. An urgent necessity was the careful study of native land tenure as an important factor in

economic development, the theory of "vacant" lands being often misleading and open to grave abuses. Mr. Morel then discussed the best means of improving native industries and helping the native to construct new ones, laying particular stress upon the great importance of extending the growth of cotton in, and promoting its export from, the tropical African provinces of the Empire. Reference was made to various measures which might with advantage be taken by Government to secure these ends, and the opinion was expressed that the only right and practical idea which should govern European action in tropical Africa (which was, and must always remain, a black man's country, where the European could not colonize and could only supervise) was to teach the native to take pride in his property; to guarantee him from molestation in his ownership of his property; to assist him in developing the raw products his fertile soil yielded for his own advantage and ours; to make it clear to him that we looked upon him, not as a fool, still less as a brute, but as a partner in a great undertaking which, if properly conducted, would confer lasting benefit upon his race and the white over-lords who have established themselves in his midst.

The scientific and economic value of botanical surveys based on the distribution of plant associations is gradually being recognized, and it is to be hoped that the work already done in this country by the pupils of Prof. Geddes and others will lead to a systematic survey, not only of the British Isles, but of our colonies. Agricultural wealth is of more permanent value than mineral wealth, and a botanical survey of many parts of the empire should take precedence even of a geological one, if, as ought to be the case, topographical, geological, and botanical surveys are not practically simultaneous.

Dr. Otto Darbishire, of the Owens College, discussed the relation and importance of botany to geography. Plants play a very important part in the composition of the scenery of our Earth. So much is this the case that a barren desert strikes us as remarkable, chiefly on account of the absence of any vegetation. The professional geographer and traveller has generally at most only a very slight acquaintance with any branch of botany. The problem before us is, Would an acquaintance with certain branches of botany be of any scientific interest or practical value to the geographer? Botany and geography meet on common ground in the following branches of botany:—(*a*) The geographical distribution of plant species. The distribution of plants when grouped according to their natural affinities into natural orders, genera, or species is seen to depend very generally on the distribution of temperature over the Earth's surface, without reference, as a rule, to local conditions. (*b*) The geographical distribution of plant forms, or ecology. The plant form is an expression of the way in which the plant body has adapted itself directly to the external conditions under which the plant is living. It affords, therefore, to a certain extent, an indication of what these conditions are. An association of similar plant forms is called a formation. The presence of any of the three chief kinds of formation, namely, forest land, grass land, and desert land, depends almost entirely on the relation existing between the supply of water available for absorption by the plant root and the amount of water given off by the plant shoot. The preponderating influence may be due to the climate (climatic formation) or the soil (edaphic formation). Temperature generally has no hand in the making of the plant form. (*c*) The influence of the plant world on the Earth's surface. Most sub-aërial plants penetrate into the soil for purposes of attachment or absorption of food material. Their action may be a physical one only, or a chemical one in addition. Plants are as often responsible for the first crumbling away of the solid rock as for the binding together of loose soil. These three subjects are of great interest to the geographer,

but ecology is, in addition, of the greatest importance to the traveller. Ecology teaches the traveller how to analyze and classify the forms of vegetation met with. He is enabled through it to make out many of the prevailing conditions by reference to the plant forms observed. He is also enabled to give a scientifically accurate account of what he has seen, because he understands the relation existing between the plants and the conditions under which they are living. A knowledge of ecology should, in fact, be considered a most necessary part of the scientific equipment of any professional traveller.

Dr. W. G. Smith, of Yorkshire College, with whose beautiful maps readers of the *Geographical Journal* are already familiar, discussed the value of observation of features of vegetation in geographical exploration. He pointed out that descriptions or even notes on vegetation were not a feature in the majority of papers in English relating to travel and exploration. Yet the vegetation of a country was, after the configuration, the most important factor in the landscape. Considerable progress had been made towards representing the vegetation of a country on maps. This was done by recording the limits of distribution of the most abundant (or dominant) plants, such as trees, and already the vegetation of considerable tracts of Britain, Europe, and North America had been charted. The detail in simple cases showed the region of deciduous trees as distinct from that of coniferous trees, and the forest lands as contrasted with treeless. Or greater detail might be shown, as in the series of maps now being issued in Britain. Vegetation charts of all parts of the Earth would be a distinct gain to plant geography. The scope of such a survey for any area would depend on the maps available and on the observer's knowledge of plants. In the case of a party which included a botanist and traversed a country with fairly complete maps, there should be considerable opportunity of ascertaining and recording the limits of important dominant plants. Such a survey, accompanied by the collecting of plants, would furnish material of great value. In the case of an expedition in an area poorly charted there would still be opportunities of collecting fragmentary evidence regarding vegetation. Notes on the dominant plants could be made at places where geographical observations were taken, and where a change occurred from one type of vegetation to another the limit could be ascertained with as much accuracy as possible. Even in a case where the dominant plants were unknown to the observer, a small collection of them labelled by numbers for reference could be afterwards identified. An acquaintance with the methods of botanical survey followed in Britain and elsewhere would be a useful preliminary for intending travellers.

Mr. Francis J. Lewis, F.L.S., University College, Liverpool, described the work he has done since 1900 in making a botanical survey of the basins of the Eden, Tees, Tyne, and Wear. The results will be published in the *Journal*.

A further contribution on this subject was that on "Peat Moors of the Southern Pennines: their Age and Origin," by Mr. C. E. Moss, B.Sc. The author classified them as (i.) Cotton-grass Moors, (ii.) Heather Moors, and (iii.) Grassy Moors. The question as to whether or not the Pennines were prehistorically tree-clad was discussed, and evidence of (i.) history, (ii.) place-names, (iii.) buried timber, (iv.) neolithic flints, and (v.) present range of British forest trees, was considered, and the conclusion arrived at that, though the Pennine slopes were tree-clad so late as Saxon and Danish times, yet at that period the summits were covered with an extensive morass. This morass was caused by the destruction or decay of forests which existed on the Pennine summits so late probably as the Roman period. In order to check the estimate suggested by the above conclusions, the mode and rate of formation of peat were considered. The author discussed (i.) the rapid

formation and (ii.) the slow formation of peat, and (iii.) the plants which form peat at the present time; and he considered that, as a rule, the peat moors of the Pennines cannot date to a period further back than about two thousand years. The paper concluded with remarks on the possible utilization of the Pennine peat moors.

Of immediate local interest was the paper on "Sand-dunes," by Dr. Otto Darbishire, read at the Botanical Section, which was supplemented by an excursion. A practical application of botanical geography was illustrated by the paper of Mr. Parry, engineer-in-chief of the Liverpool waterworks, on the afforestation of waterworks catchment areas, with special reference to the case of Liverpool. This paper, unfortunately, was read in the afternoon, but though there was a comparatively small audience, it gave rise to a most animated and practical discussion. Mr. Parry showed the advantages likely to arise from the afforestation of waterworks catchment areas. He said the authorities of many large towns, such as Manchester, Liverpool, and Birmingham, and of many smaller towns, had been led to the conclusion that the purity of their water-supplies could be effectually secured only by their becoming the owners of the watersheds, and Parliament had readily granted the necessary powers. On the question how these areas were to be utilized, Mr. Parry said that, in order to reduce to a minimum the risks of polluting the water in a manner likely to produce disease, the first object must be to limit the resident population to the lowest number reasonably practicable, and this could not be done if agricultural operations were allowed to be carried on in the ordinary way. For a large proportion of these areas timber-growing might justly claim to be the most profitable use to which the land could be applied; whilst the effect of trees upon the yield and quality of the water collected could not be otherwise than beneficial. Mr. Parry then explained what had been done in the way of afforestation by the Liverpool Corporation at their Vyrnwy watershed in North Wales.

Three communications related to physical geography. Prof. Pettersson, of Stockholm, discussed the influence of ice-melting upon oceanic circulation, and showed an experiment of Mr. J. W. Sandström illustrating the effect of melting ice on the movement of salt water. Prof. Pettersson's paper will be published in the *Journal*.

Dr. Vaughan Cornish presented the report of the committee on terrestrial surface waves, and showed a number of exceptionally clear and beautiful views of waves, more particularly in the Niagara falls and rapids.

Mr. Heawood made the only communication on the history of geography in his paper on "Henricus Glareanus (sixteenth-century geographer) and his Recently Discovered Maps," which will be separately published in the *Journal*.

The needs of modern surveyors was discussed by Mr. E. A. Reeves, in a paper entitled "Notes and Suggestions on Geographical Surveying suited to Present Requirements," which will be separately published in the *Journal*.

Mr. G. James Morrison afterwards discussed the map projections suited to general purposes.

A joint meeting of the Geography and Education sections was held to discuss geographical education, and is separately repeated.

GEOGRAPHICAL EDUCATION AT THE BRITISH ASSOCIATION.

A JOINT meeting of the Geography and Education Sections of the British Association was held under the presidency of Sir William Abney and Captain Creak during the recent meeting at Southport, to discuss the subject of geographical education. At a time when our educational systems are being closely examined, and when great administrative changes have just been effected, it is most important that the educational value of geography should be recognized by educational authorities, and that it should be used to bind together the at present largely unco-ordinated subjects of which teachers complain they have too many. The organizing committees of the two sections are to be congratulated on arranging the discussion, which was opened by Mr. Mackinder in an address characterized by its broad outlook and wide sympathy. The following abstract presents the salient points of the address: *—

Classics and mathematics are effective educational disciplines largely because, as the result of long experience, they can be taught by methods which are progressive from the lower to the higher forms of a school. If geography is to be generally utilized in secondary education it must become similarly *progressive* rather than merely cumulative of facts. In practice this implies the fulfilment of three conditions—

(1) That the pupils be classed in special "sets" for geography, lest they omit stages in the argument;

(2) that the master know the subject thoroughly; and

(3) that the public examinations be based on some generally accepted sequence of exposition, as in the case of languages and mathematics.

It would probably be hopeless to expect a general fulfilment of the first two conditions unless the third be practicable. It is well, therefore, to concentrate attention upon this.

The phenomena of geography are capable of arrangement upon alternative principles, either according to regions or according to categories. In the one case the chapter-headings of a text-book would be such as "France," "India," etc.; in the other they would be such as "volcanoes," "climates," etc. The former is spoken of as regional geography, the latter as general, or commonly, but unfortunately, as physical geography. In the university the general classification may often be advisable, but in the school it is submitted that the *regional* basis should in the main be adhered to, for distribution is of the essence of geography, and imparts to regional geography a unity not possessed by physical geography. Indeed, the latter might be described as a series of chapters treating of the geographical aspects of other sciences—astronomy, geology, meteorology, botany, zoology, anthropology, strategy, economics, and history. The separation of school geography into two subjects, topography and physical geography, has probably done more than anything else to arrest its development as a discipline.

It is suggested that it would be quite possible to weave into the regional treatment so much as is needed of other sciences by taking these in *one at a time* in the successive stages of the strictly geographical argument. This idea will be most easily conveyed by sketching a possible course of instruction. Let it be divided into six stages, of which the first will be elementary, the next four secondary, and the last higher.

STAGE 1 (elementary).—It is agreed on all hands that the teaching of geography

* A full report of this discussion is published in the *Geographical Teacher* for October.

should commence with the home. This, however, involves, among other things, the observation of the apparent movements of the sun and stars, and hence their explanation by means of the globe. The lie and names of the continents and oceans would also be learnt upon the globe, and some idea of their chief contrasts won from the reading of simple stories of discovery, adventure, and travel, the teacher everywhere asking the pupil to contrast with the home conditions.*

Stage 2 (ages thirteen and fourteen).—This, which is usually omitted, should have for subject such a wider "home area" as would permit of the study of entire river-basins, water-partings, coast and hill forms, etc. The real study of the use of maps as opposed to mere plans and sketch-maps would commence here, and this would be the approximate stage for the introduction of such ideas as the deposition, folding, faulting, and sculpture of rock strata as explanatory of the surface forms.

Stage 3 (ages fourteen and fifteen).—Here the "home country," the British Isles, would be considered as a whole. The land-forms and essentials of structure would be quickly yet accurately conveyed by the use of the ideas and terms learnt in Stage 2, and time would thus be available for a thorough explanation of the climatic contrast; a subject unsuited to Stage 2 by reason of the limitation of the area then studied. Moreover, the teaching of elementary physics by the science master would at about this stage render the fundamental ideas involved more easily appreciable.

Stage 4 (ages fifteen and sixteen).—Here we come to the comparison of the home country with the great civilized countries of Europe. The physical facts, both morphological and climatic, would be conveyed quickly yet accurately by means of the ideas and terms learnt in Stages 2 and 3, and special stress would now be given to the political and economical facts. The pupils would be ready for these by reason both of their progress in history and of their increasing interest in the newspapers. Care would be taken to correlate the political with the physical. Problems and essays would be set.

Stage 5 (ages sixteen and seventeen).—This would be devoted to the study of the whole globe, especially outside Europe. It might include more accurate astronomical ideas (*cf.* Stage 1), for which the pupils would have become fitted by reason of their mathematical studies; also the leading facts conditioning plant-life. Both of these contributions would be pertinent to the treatment of climates. The history of discovery (*cf.* Stage 1) would be utilized in explaining the chief place-names. The pupils would by this time have accumulated a considerable background of knowledge which would be appealed to. The increasing wealth and variety of the data would necessitate firm grip on principles and a logical method. Therefore a specialist teacher would be advisable in order to obtain mental discipline, just as a classical sixth form requires a composition master.

Stage 6 (university and college).—Here we should naturally find both deeper intension and wider extension. By the adoption in part of the general classification—*i.e.* by the study of the distribution of particular types of phenomena—the student would become critical and be prepared for original research. On the other hand, by the complementary effort to construct a harmonious regional geography out of a great series of varied data, he would be inspired with a broad and philosophical outlook.

Nowhere is the contrast between the general and the regional method more conspicuous than in the treatment of the wind system. The temptation is great

* In the case of children not proceeding to secondary schools, selected portions of Stages 2 and 3 must be taken in the latter part of the elementary training.

to commence deductively from an imaginary landless globe. But this is essentially unsound, because it implants wrong and unscientific habits of thought. The trade winds, for instance, should first be learnt of and *realized as a great fact* in the description of the North Atlantic, the complementary wind being added in the description of the South Atlantic. The double system would then be found again in the Pacific, and a generalization demanded by the pupil which would presently be limited by the facts of the Indian ocean. The Sahara desert would carry the generalization a step further and into apparently different phenomena. Only in the end would deduction from ideal zones or belts of climate be permitted by way of mental stocktaking.

The criticism of the practical teacher for such a scheme as is here outlined would probably be grounded on limitations of time. It is submitted that with the pupils in geographical sets, specialist teachers, and agreement as to examination bases, very much might be accomplished even with the hours now usually available. At the risk, however, of appearing visionary, it is further submitted that those hours should be extended on the ground that geography is one of six elements needed in any liberal as opposed to technical education. These elements are—

(1) Language, with reading and writing as its implements, and the mother, the foreign, and the dead tongues as its varieties.

(2) Mathematics, or training in abstract thought.

(3) Experimental science, or training in thought about concrete things.

(4) History, or outlook through the time covered by human records.

(5) Geography, or outlook through the space accessible to men.

(6) Religion and philosophy.

It is submitted that the inclusion of these six elements in a general education is more essential than the study of several varieties of any one, *e.g.* several languages or several sciences.

Apart, however, from any such theoretical argument, it is claimed that geographical teaching, if it deals with real conceptions and not merely names, trains in the mind a distinct power, that of thinking in terms of the map, of visualizing intricate correlations, of ordering complex masses of fact—a power of the utmost value in the practical affairs of after-life. Geography rightly taught should tend to correct the academic bias of linguistic and mathematical study, the specialist bias of scientific study, and the archaic or sentimental bias of historical study. Its danger lies obviously in superficial knowledge and uncritical thought. Taught in the past too often by those who knew little of it, geography has no doubt deserved its inferior position among educational disciplines.

Finally, it is submitted that geography can be placed in its rightful position only by the simultaneous application of a four-fold policy—

(1) The encouragement of university schools of geography where geographers shall be made, of whom many will become secondary teachers.

(2) The appointment of trained geographers as teachers in our secondary schools, either for geography alone or for geography and general help in other subjects.

(3) The general acceptance of a progression of method in the subject, not expressed in detailed syllabuses issued by the State or other dominant authority, which would tend to stereotype teaching, but in a tradition similar to that which at different times has governed the teaching of language and mathematics.

(4) The setting of examinations by expert geographical teachers.

It is obvious that these four measures must be applied simultaneously, for schools will not appoint specialist teachers unless there is a supply of them to

select from; and yet a supply will not be forthcoming unless there be a promise of posts, nor is the teacher independent of the examiner or yet of the general esteem of his subject based on a belief in the value of its methods.

An Ounce of Fact.—The adoption of a new syllabus for geography in the London Matriculation and of geography as an obligatory subject in the Intermediate Examination of the Faculty of Economics and Commerce, coupled with the appointment of a holder of the diploma of the Oxford School of Geography as teacher of the subject at University College School, London, has contributed to results which are patent in the Pass List issued last month by the London University.

Captain Wilson-Barker said that pupils should be encouraged to draw their own maps, and to fill them in; their attention should be directed to prevailing meteorological, geological, and biological features in different countries, and the influence of these on existing conditions should be traced. Pains should be taken to stimulate the student's interest and arrest his attention.

Mr. Hugh Richardson, of York, gave a most inspiring account of his own experience of what could be done in a boarding school with boys from thirteen to seventeen years of age. He described lessons based on the 1-inch Ordnance sheets; experiments carried on in the laboratory, on which books gave little help, such as an investigation into the nature and properties of sand; and the value of using literature in teaching science. His contrast of the scientific description "8 p.m. cirrus" with Ruskin's "the whole heaven one scarlet canopy tossing vault beyond vault as with the drifted wings of many companies of angels" was most effective, and his insistence on the importance of neglecting neither most convincing.

Mr. Cloudesley Brereton, Inspector of Schools in Ireland, drew a dark picture of still-existing ways of teaching geography. He pointed out that even with the limited time at our disposal, we could improve matters a good deal if we began by making jettison of much of the lumber which encumbered our geographies to-day, and weaving into a logical and systematic treatment the bays, islands, rivers, etc., of the country to be studied, with configuration and climate taken as its basis. Even if all these ideas were carried into practice, there were still three main difficulties with which the teaching of the subject would have to be content—the lack of adequate preparation in the pupils on their entrance into the secondary schools, the lack of really qualified teachers, and the lack of touch between the examiners and the schools.

Mr. G. Fletcher considered that physical and not regional geography should be the foundation of geographical teaching.

Mr. J. L. Holland, of the Assistant Masters' Association, thought that Mr. Fletcher had not quite understood what regional geography was, and had confused it with the old lists of place-names which did duty for it in antiquated text-books.

Mrs. Herbertson dealt with the objection that young children could not understand a map, and pointed out that such a graphic method of recording natural features as an Ordnance map was in harmony with a child's natural tendency to represent a road by straight lines, a wood by little trees, a house by a little square. She thought that intelligent children of eight or nine readily learned to read a map, and that if allowed access to different kinds of maps—physical maps, vegetation maps, climate maps, etc.—they puzzled out for themselves a great deal of information which it would be laborious to memorize verbally.

Mr. Scotson, of the Central School, Manchester, said what was required was that the teacher should have freedom and be able to carry out his own methods. Inspectors had very different ideas as to the course the teacher should pursue in

teaching many subjects, especially geography. Some endeavoured to force the teachers to adopt their plans; if teachers did not agree with their suggestions, they were likely to suffer. Worse still: these inspectors were constantly changing; so the teacher was asked to change his course of instruction, and adopt a plan which he did not think a good one. This was his personal experience at the present moment. A teacher who thought out a plan for himself and believed in it, was much more likely to teach the subject with enthusiasm, and with good results. Enthusiasm in a teacher spread to his pupils, and the pupils became interested; their intelligence was awakened, and the whole lesson became a pleasure to teacher and taught. Therefore he asked for freedom for the teacher.

Prof. R. A. Gregory considered that the reason why the many otherwise excellent syllabuses drawn up by societies interested in the study of geography had had so little effect was that the schemes suggested were not practicable under the ordinary conditions of school-work. With a class of half a dozen pupils and perfect freedom, it might be possible to carry on field-work in school hours, but such work could not be included in the ordinary time-table. Practical work is required which can be done in the class-room when the geography period comes round, for field-work could not, in most cases, be seriously considered as part of the school curriculum, and it must be done in leisure hours. To effect any change at present, it was necessary to show how geography could be studied intelligently in forms, and not in sets, with an untrained but intelligent master in charge, and various examination requirements as a prospective end. Mr. Mackinder's three principles implied ideal conditions of work which might be aimed at, but were not likely to be realized for some time to come.

Miss L. Edna Walter, Inspector to Board of Education, said that inspiration and ideals were needed, and Mr. Mackinder had given them. One speaker had referred to the lists so often learnt. Those lists were no longer of capes and bays, but, as commercial geography suggested other things, lists of imports and exports. She would set special stress on Mr. Mackinder's statement that the shorter the time at the disposal of the teacher, the more important became the method, and the greater the need for thorough training.

Mr. G. F. Daniell, Chairman Education Committee, Teachers' Guild, said that from a schoolmaster's point of view it did not appear that Mr. Mackinder had met the objections to reclassifying pupils into "sets" for different subjects. "Specialists" should be very sparingly employed, but it might be advisable to employ a specialist to teach geography throughout the school, because of the *newness* of the subject in its modern form. It was time we revised our provisions for laboratory work. Instead of chemical and physical laboratories designed for the use of pupils of thirteen and upwards, would it not be better to have junior and senior laboratories and a *sanctum* for the most advanced pupils, and make provision in the junior laboratory for experimental teaching of geography?

Mr. Mackinder replied to the objections raised against his proposal that the pupils should be grouped in "sets," by pointing out that boys came to public schools from very different preparatory schools, in which very various ideas of geography prevailed, and that they entered the public school some into one form, some into another, so that there was just danger of omitting essential stages in a progressive curriculum.

REVIEWS.

AFRICA.

Uganda and the Upper Nile.

'Service and Sport on the Tropical Nile.' By Captain C. A. Sykes, R.H.A. London: Murray. 1903.

The author of this book pleads guilty—quite unnecessarily, we think—to the *cacoëthes scribendi*, which assails so many travellers, and which fills the shelves of our libraries with so many productions of an ephemeral character. The book is of a very different nature from the general run of these, for, although it was apparently the love of adventure and the irresistible desire to wander afield which led Captain Sykes to Africa, he possessed the far from common gift of realizing the valuable training and broadening of view which may come to a thoughtful mind from the new experiences gained in a wild country such as Central Africa, and his book shows that he made good use of his opportunities in this direction. He is not content with narrating personal incidents, as do so many of those who travel primarily for purposes of sport, but brings to bear his powers of reflection and observation on the events and scenes with which he has been brought in contact.

Apart from this, the book will take a place of its own in African literature, as dealing with a critical period of transition from the old to the new *régime* in Uganda, about which no large amount has yet been written. Captain Sykes went to Uganda as one of the special service officers sent out at the time of the Sudanese mutiny, and spent two years in the country, during which he traversed many of the outlying districts, and played his part in the establishment of British authority on the Upper Nile, though he did not remain long enough to see communication opened with the Anglo-Egyptian authorities in the north. His spare time was devoted, apart from sport, to such pursuits as entomology, which he found of much interest, and which, with kindred subjects, such as geology, he strongly presses on the attention of those whose lot is cast in similar circumstances, as a means of gaining both enjoyment and intellectual profit. Although much of the country has often been described before, Captain Sykes' vivid descriptions will be read with advantage by those anxious to form a true picture of its character. Special mention may be made of his account of the Murchison falls, which are placed only second to Kilimanjaro—"the most glorious sight on the continent"—for majestic impressiveness.

It is, however, the serious and philosophic spirit displayed throughout which distinguishes the book from the ordinary run of books of travel, and which we could wish were shared by more of those who enjoy similar opportunities. Of the scope for its employment in out-of-the-way regions there can be no doubt, even though Captain Sykes may be inclined to press too hard Shakespeare's dictum that "Home-keeping youth hath ever homely wits."

West Africa.

'West Afrika.' Von Moritz Schanz. Berlin: Süsserott. 1903.

Without going far from the beaten tracks, Herr Schanz has travelled widely, and is known as the author of various works which stand much above the level of those of the ordinary globe-trotter, on account of the great care with which the author has made himself acquainted with all the information available regarding the countries he has visited, and the thoroughness with which he has studied the economic and other questions presented by them at the present day. His books,

therefore, possess considerable value, both for the shrewd personal observations contained in them and the amount of information brought together in a handy form from a great variety of sources. The latest of the series, devoted to the various European possessions in West Africa, is particularly useful for the mass of information which it supplies on the recent development of European activity and commerce in the several spheres, and at a time when more and more attention is being paid to the economic possibilities of that region. It is likely to take a recognized place as an authority, alongside of such works as Mr. E. D. Morel's 'Affairs of West Africa,' though written rather from the point of view of the compiler of statistics, than to further any definite principles or policy. It is not easy to gather whether Herr Schanz has acquired a first-hand knowledge of West Africa, or whether the book is based entirely on material brought together at home. Its form is that of a systematic treatise on the various countries dealt with, preceded by an excellent sketch of the conditions of physical environment, a knowledge of which is of such prime importance in the consideration of the problems which face those interested in the future of the African continent.

Early African Cartography.

'Topographische Studien zu den Portugiesischen Entdeckungen an den Küsten Afrikas.' I. Von Sophus Ruge. Leipzig: Teubner. 1903.

Prof. Ruge has undertaken what promises to be a most valuable study of the representation of the African coasts on the Portolani and other early maps. His aims, as set down at the outset, are five-fold, and consist in the endeavour to determine the proper form of the names inserted in the Portolani, their proper sequence along the coasts, the date and author of their discovery, the reason for and meaning of the names, and, lastly, to arrive at some conclusion, from a comparison of the legends, as to the date of maps to which no date is assigned on existing copies. A somewhat similar inquiry has been carried out by Mr. Ravenstein, in connection with the voyages of Cão, Diaz, and Vasco da Gama, but Prof. Ruge's investigations are apparently intended to be much more exhaustive, both as regards time and space, and, even where they merely endorse the conclusions of former commentators, will be useful as placing our knowledge of the historical cartography of the African coasts on a more systematic basis than heretofore. From a somewhat broader point of view, the results are instructive as illustrating the *modus operandi* of the makers of Portolani, and showing how, while in some cases names were slavishly copied from one to another, in others a certain amount of critical judgment was displayed.

The present instalment deals with the north-west coast from Tangier to Cape Bojador, on which stretch no fewer than sixty-seven separate names are to be found on one or other of the charts examined. The first section passes these charts in review, from the marginal drawings inserted on manuscripts of Dati's 'La Sfera,' to the map of Saluat de Pilestrina of date 1511, and the conclusions arrived at on disputed points are of considerable interest, even when (as in the case of many of the doubtful dates) they merely suggest probabilities. The list is somewhat more complete than that given by Mr. Beazley in the Hakluyt Society edition of Azurara (to which, strange to say, no reference appears to be made), although for the latter part of the period it has been found possible to speak particularly of only the leading types.* We can only briefly refer to some of Prof.

* Thus, we find no special mention in this section of the British Museum map by H. Martellus Germanus, nor of the Canerio or Cantino charts, while others are only casually alluded to.

Ruge's views on points of wider interest in the history of cartography. The Dati sketches he is inclined to consider rather as representing a class of early route-maps than as the prototypes of the Portolani. The Pisan chart may, he thinks, date back (as regards its sources, at least) to a time prior to the first Genoese navigations in the Atlantic, while in any case it can only mark the first beginnings of coast-surveys on the Atlantic coasts of Africa, such as were probably inaugurated soon after the Genoese expedition to Ceuta in 1234–35. He throughout strenuously upholds the claim of the Italians, as against the Catalans, to be considered as the first producers of Portolani; accepting the Italian origin of Dalorto's (or "Dulcert's") maps of 1325 and 1339, and pointing to the Italian influence traceable in subsequent Catalan maps.* The second of these two maps of Dalorto's marks a new era in the development of knowledge of the African coasts, the regular succession of names given by it being continued, with comparatively few additions, right through the fifteenth century. Prof. Ruge follows Kretschmer in holding that Perrinus and Petrus Vesconte were two distinct individuals, and also that Petrus was the author of the maps in Sanudo's 'Liber Secretorum fidelium Crucis.' The famous 1448 map of Andrea Bianco ushered in the advance of knowledge respecting the coast south of Cape Bojador, but it is to Roselli, and especially to his chart preserved in the Egerton collection at the British Museum, that the principal merit is assigned for the evidences of a critical spirit displayed. On grounds which are not entirely convincing, Prof. Ruge assigns to this map a date subsequent to 1470. For a comparison of the main types during this period, he gives a table showing side by side the legends occurring on each of the maps from Tangiers to Cape Bojador.

In the second part of the monograph, the author discusses in turn each of the sixty-seven names, tracing the variations in form that are met with in the several maps, and, where possible, identifying them by the aid of ancient or modern descriptions. In the case of some of the names (*e.g.* Rotima, which appeared in one form or another on many maps of the fourteenth or fifteenth centuries, to be finally discarded by Roselli), no satisfactory explanation can be arrived at, while in others the disappearance of the name (*e.g.* Tusimusi, Turococo, etc.) was due to the decline of the place from former importance. Special attention is given to the legends between Aglu and Cape Bojador, of which a comparative view is again given. Prof. Ruge shows that this permits the conclusion that, as a period of advance was ushered in by the maps of Dalorto in the fourteenth century, so in the fifteenth a new improvement is especially to be dated from the "Ginea Portogalexe" preserved in the Egerton collection at the British Museum.

GENERAL.

Early Travel.

'The Text and Versions of John de Plano Carpini and William de Rubruquis as printed for the first time by Hakluyt in 1598, together with some shorter pieces.' Edited by C. Raymond Beazley, M.A., Fellow of Merton College, Oxford.

When the Hakluyt Society contemplated the reprinting of the 'Principal Navigations,' the first volume was assigned to the editorship of Mr. Raymond Beazley. The Society abandoned its intention when a similar undertaking was announced by a Glasgow publisher. But in the meanwhile Mr. Beazley had proceeded with his task with his usual indefatigable industry, and his elaborate

* Prof. Errera has lately shown that Roselli, in his map of 1447, acknowledges the influence of Beccario of Genoa (*ante*, p. 113).

notes were the results of such careful and successful research that the Council thought it right to include this opening portion of the 'Principal Navigations,' with Mr. Beazley's annotations, in a special octavo volume of 345 pages, including index.

Mr. Beazley supplies useful notes for the extracts from Geoffrey of Monmouth, the voyages of Oht-here and Wulfstan, the chapter on the Cinque Ports, and the letter of Ivo of Narbonne; but he has concentrated his attention mainly on the journeys of Carpini and Rubruquis.

Mr. Rockhill has truly said that the narrative of Friar William of Rubruch should reach as high in geographical literature as that of Marco Polo, his better-known successor; and that of Carpini completes and corroborates the story of Rubruquis. Hakluyt printed from a manuscript then in the library of Lord Lumley. In the course of his researches with a view to the collation of Hakluyt's text with existing manuscripts, Mr. Beazley made two important discoveries. The first was that a manuscript in the British Museum, hitherto supposed to be quite distinct from the Lumley manuscript, was identical. The second was the existence of a hitherto unexamined manuscript of Carpini in the library of Corpus Christi College, Cambridge. There are only three other manuscripts, one at Leyden, one in the Bibliotheque Nationale of Paris, and a fifth, which is only a copy of Hakluyt's text, also in Paris.

Of the manuscripts of Rubruquis, there are three at Cambridge, one in London, and one in Leyden.

Mr. Beazley has made a detailed re-examination of these manuscripts, noting the differences between the readings, which entailed an immense amount of labour combined with very profound learning and great critical insight. No one could have achieved such a literary undertaking unless he was endowed with indefatigable perseverance, and with an amount of zeal and devotion to the cause of geographical research which are deserving of the highest commendation. The narratives of the two travellers are worthy of the infinite care that has been bestowed upon them, and geographers owe a debt of gratitude to Mr. Beazley for a work which is really a monument of patient and intelligent research.

CLEMENTS R. MARKHAM.

A GEOGRAPHICAL YEAR-BOOK.

'Geographen-Kalender, . . . herausgegeben von Dr. Hermann Haack.' Erster Jahrgang, 1903–1904. Gotha: Perthes. 1903.

While not intended to take the place of more elaborate works of reference, such as the 'Statesman's Year-book' or Wagner's 'Geographisches Jahrbuch,' this little book, from its compact and handy form, and the inclusion of certain features not found in former publications of the kind, is certain to take its place as an indispensable work of reference for geographers, no matter of what nationality. Besides presenting a valuable bird's-eye view of the progress of geography in all its branches during the past year, it supplies both the geographer and the general reader with a large amount of practical information of a kind which is constantly required, but which is not always easy to obtain ready to hand. Thus the useful tables included under the heading "Kalendarium" supply data respecting the dimensions of the earth, the area of a one-degree trapezium in different latitudes, the lengths of the degree both of latitude and longitude according to the variation of the former, the determination and comparison of map-scales, etc. The second section deals with the events of the year in the field of international political relations, the development of communications, and the like; while the third, from the experienced pen of Dr. H. Wichmann, gives a comprehensive summary of

the progress of geographical exploration and research. As in most parts of the work, attention is on the whole given impartially to the work of all nations in this field, and if we miss the names of one or two English travellers (Colonel Manifold and Major Ryder in China, Mr. Campbell in Mongolia, Mr. Hanbury in Arctic America) who have done work worthy of mention, this is probably due to the little that had been published when the section was written on the subject of their journeys. The review of geographical literature, while, of course, making no attempt at exhaustiveness, gives an excellent idea of the most important work done in this direction in all countries during the year. The editor's own section, on educational geography, is one of the most novel features in the volume, but at the same time one in which its comprehensive character is least maintained, for attention has been focussed throughout, no doubt intentionally, on the state of geographical education in the German-speaking countries. The statistical section comprises in a very compact form the principal data regarding all the countries of the world in alphabetical order, while the "Geographisches Adressbuch" is most useful, as giving for the first time the names and addresses of geographers throughout the world, with brief statements of the particular field of activity of each. Altogether the work is calculated to contribute, as purposed by its originators, towards the drawing together of workers in the field of geography all the world over.

The British Empire.

'The British Empire Year-book.' By Edgar G. Wall. London: Edward Stanford. 1903.

This large volume, which extends to nearly 1300 pages, and aims at giving the most important statistical and other official information available on England and her foreign and colonial possessions and protectorates, appears this year for the first time. While covering the ground of the 'Colonial Office List,' it renders accessible much additional information for which the statesman and geographer in search of facts would otherwise have to consult, at no little expenditure of time, the consular and Colonial Office reports. The first issue of a work of this nature, dealing as it does with so vast an array of figures and with so many and varied subjects, must of necessity contain imperfections; but we have not noticed any of importance, and the information appears to have been brought up to date, several quite recent appointments being duly recorded. In some cases, perhaps, there is a certain want of proportion. Thus, for example, though Wei-hai-wei is not a very extensive territory, it is of some importance just now, and six lines is hardly sufficient to devote to it, the more so in view of the fact that the last Colonial Office report extended to fifty-seven pages. Similarly, while Labuan occupies five pages, only two are devoted to Sarawak, and but one to British North Borneo. But these are, after all, trivial defects when the general usefulness of the volume is borne in mind.

Tropical Diseases.

'Tropical Diseases.' By Patrick Manson, M.D., F.R.S., etc. New and revised edition London: Cassell. 1903.

The issue of a new edition of Sir Patrick Manson's admirable text-book on tropical diseases illustrates the remarkable progress which has been made within the last ten years in the investigation of diseases which are prevalent in warm climates. The present edition gives clearly and concisely the generally accepted views on the malaria question up to date, and although it is intended for professional readers, it will doubtless be consulted by many travellers who are obliged to encounter, without medical help, the risks of a tropical climate.

Further than this, Sir Patrick gives a great deal of valuable information concerning some of the many parasites which play an important part in the production of disease in the tropics. Ankylostomiasis, which is the name of the disease which gives rise to the extreme form of anæmia which is common in Egypt, and is now known to be present in many other parts of the world, is carefully dealt with. Filariasis, which is directly or indirectly connected with various serious diseases, such as elephantiasis, is fully discussed, and no one is better able to do this than Sir Patrick Manson, who was the discoverer of the fact that the mosquito is the intermediate host in the transference of a certain species of filaria from man to man. This was an important discovery in itself, but still more so in that it led to the suggestion which Sir Patrick afterwards made that the mosquito was concerned in the transmission of malaria, which theory was proved first by Major Ross's patient researches in India and elsewhere.

The latest discovery which finds a place in this volume is the connection of the trypanosome with a serious disease in man. This parasite is responsible for the disease in horses which has for many years been known to be connected with the tsetse-fly. This disease is known as trypanosomiasis, and affords another argument in favour of the adoption of methods of protection from the bites of insects.

Full information will also be found in this new edition as to sleeping sickness, which is proving a most serious hindrance to the development of many parts of Central Africa, and, in fact, information may be obtained concerning all tropical diseases which are known to science. It should be used, at least as a work of reference, by every traveller in the tropics, unless he has access to qualified medical assistance.

CHARLES F. HARFORD.

THE GEOGRAPHY OF DISEASE.

'The Geography of Disease.' By Frank G. Clemow, M.D. EDIN., D.P.H. CAMB., Cambridge Geographical Series. 1903.

The inclusion of the subject of the geographical distribution of disease in the Cambridge Geographical Series is an evidence of the rapidly growing importance of this department of geographical science. It is not the first time that an attempt has been made to group diseases according to their geographical relations, but it is only of recent years that it has been possible to do this in any scientific manner, owing to the important discoveries which are now being made as to the causation of diseases. Another reason which has led to new practical interest in this subject is, as Dr. Clemow points out, the colonial expansion of the different European Powers, which has rendered imperative the study of the diseases which are to be met with in different regions of the world.

In earlier times diseases were traced largely to meteorological conditions, such as heat, cold, or moisture, to geological features, or to other special characters of the soil, and in the special prevalence of malaria in low-lying districts, on the banks of rivers, or near the sea coast there appeared to be good proof of the influence of the soil. Dr. Clemow discusses these problems in his introduction, which should be carefully studied before attempting to read the chapters on different diseases, and he shows that, whilst there probably is some foundation for these old theories, the larger number of diseases, and especially of epidemics, are due to the presence of certain parasites. These may be either animal or vegetable, and they may be sufficiently large to be easily detected without any special apparatus, or they may be so small as to require the highest powers of the microscope in order to detect them. The geography of disease is therefore related to the life history of living organisms. Nor is this all. It has been discovered within the last few years that many microorganisms of disease are conveyed outside the human body

by the agency of insects, so that the prevalence of the disease may be expected to coincide to a considerable extent with the distribution of these insects, or at least not to go beyond the regions where they are found.

Problems such as these are carefully considered in this interesting volume, which contains a large amount of information which could only have been obtained before from very diverse sources.

There are two methods which might have been adopted in dealing with this subject, one the description of a particular country and the diseases which are to be found in it, or, as Dr. Clemow has done here, the description of each several disease, and the parts of the world in which it may be found. This is probably the most practical plan, but it would have been useful to have supplemented these by a summary showing the diseases which are common in the most important countries. Dr. Clemow has attempted to do this to some extent by a few maps, but these are not, in our opinion, sufficiently large or exact to be of very great service, and it is greatly to be hoped that some one will take in hand the production of a really good atlas of disease. This book does not make any very material addition to our knowledge as to the distribution of the better-known tropical diseases, such as malaria, cholera, plague, or yellow fever; but the articles on various parasites, such as the different varieties of *Filaria*, *Ankylostomum duodenale*, and others of the same class, will probably open the eyes of many to the special risks which are met with in the tropics.

The distribution of the more common infectious diseases of temperate climate, and of those which are common to hot and cold climates, is also discussed; but it is much more difficult in these cases to explain the method of distribution. It is clear that the vast problem which is discussed in this small volume is one which needs a great deal of attention, and should have an important bearing upon the investigation of disease. We congratulate the author upon the large amount of accurate information which he has given us in this small volume. It was no doubt considered that the careful table of contents would take the place of an index, but we think that a detailed index would have been welcome, and we hope it may appear in a future edition. CHARLES F. HARFORD.

GEOGRAPHICAL BIBLIOGRAPHY.

'International Catalogue of Scientific Literature. First Annual Issue. J: Geography, Mathematical and Physical.' London: Harrison & Sons. 1903.

Among the volumes so far published of the first annual issue of this catalogue (which embraces the publications of 1901), we may now number that dealing with Geography, and it is therefore possible to form some idea of the prospective value of the catalogue to students so far as it concerns our own science. In view of the great difficulties which must beset the first inauguration of such an undertaking, in which workers throughout the world have taken part, it is not to be supposed that complete success would be attained at the outset, and it would not be just to regard the results attained in too critical a spirit. But as it is to be presumed that modifications will be introduced in course of time, it may perhaps be permitted to point out some of the directions in which they seem desirable, while fully recognizing the usefulness of the catalogue even in its present form.

There are probably both advantages and disadvantages in the method adopted, according to which the literature of each separate country is brought together by workers within that country. The most important gain—and it is a real one—consists in the fact that many valuable papers which have appeared in less-known periodicals, or such as only occasionally deal with scientific questions, are in this

way gathered in, which could hardly be the case were the whole work in the hands of a central organization. On the other hand, entire consistency is hardly to be attained when the interpretation of the rules—not always an easy matter—falls to so many different individuals as have co-operated in the collection of titles. Such lack of consistency is perhaps especially to be expected in the geographical volume, by reason of the limitation of its scope to the Mathematical and Physical sides of the subject, and the difficulty of drawing a hard-and-fast line between these and other branches. It being left to individual workers to decide in each case, it is not surprising to find that, whereas in some cases Physical Geography is interpreted as including general descriptions of the physical features of a country, which are to be found to a certain extent in most books of travel, in others it has probably been taken to refer more exclusively to the principles of the science. Again, while the heading "History," which forms one of the general subdivisions common to all the sciences, was probably intended to embrace only the history of the special branches dealt with, some of the collectors of titles have evidently interpreted it as including the general history of discovery. On this account, it is all the more to be regretted that the scope of the catalogue has been limited so as to exclude all reference to Anthropogeography in its various branches, which may be, and so often is, dealt with in a thoroughly scientific spirit, while the essential unity of Geography as a science in itself is left out of view by such limitation.

The arrangement of the entries within the subject-catalogue (which forms the second half of the work) can hardly be thought entirely satisfactory. The schedule which was issued for the guidance of the workers started, as was but fit, from the two main headings of "Topographical" and "Subject Classification." It was, however, left to individual interpretation to decide whether these were to be used in conjunction (and, if so, which of the two was to be subordinated to the other) or alternatively. The mode of entry most useful to the geographical student would probably have been that in which all works relating to a special region were put down primarily, under the heading of such region, in the topographical classification (this being undoubtedly the most important basis of arrangement to the geographer), while the subject classification was reserved for works dealing rather with special features or principles (special features of definite areas being possibly repeated from the topographical division). It has, however, been decided to subordinate the topographical to the subject arrangement, though the practical disadvantages of this have, it is true, been minimized by the adoption, under "Physical Geography," of a general heading which, in practice, embraces the vast majority of all the entries. A difficulty, however, remains, for although entries which refer, say, to the survey of a particular country, cannot properly be placed under the general physical geography of that country; if this is not done, the references to the literature on any given country are still widely scattered. The extent to which topographical entries have been duplicated under subject-headings also varies enormously. The subdivisions of "Physical" and "Mathematical Geography" are, again, hardly satisfactory, as they are sometimes wanting in logical sequence and a proper subordination of the particular to the general; while, on the other hand, they are far from exhaustive. It is much to be regretted that the admirable classification of the science by Dr. Mill for the card subject-catalogue of our own library could not have been adopted.

As already said, it is a distinct merit of the catalogue that it makes known to students a number of papers occurring in less-known publications, which might otherwise escape notice. Still, the present issue, at least, is by no means complete, for many foreign papers issued in 1901, which are to be found in our own library and subject-catalogue, have not yet found a place in the International Catalogue.

This will, no doubt, be remedied as time goes on. A word of praise should be given, in conclusion, for the great care with which the proof-reading has been done, and the striking absence of typographical errors, which might easily be overlooked where so many different languages are represented.

THE MONTHLY RECORD.

EUROPE.

Ice-formation in the Lakes of the Austrian Alps.—Dr. Johann Müllner treats of this subject in the latest issue of Penck's *Geographische Abhandlungen* (vol. vii. part 2, 1903). After referring to previous work in regard to the freezing of other European lakes done by Forel, Hildebrandsson, Holmsen, and others, and describing the nature of the observations on which the present study is based, the writer examines in turn the phenomena connected with (1) the period preceding the first formation of ice; (2) the interval between this and the closing of the whole lake; (3) the period during which the lakes are ice-bound; and (4) the interval between the first indication of thaw and the complete disappearance of the ice. The course of these events is followed in great detail for a large number of the Austrian lakes, those of the Reschen-Scheideck affording data for the most complete study of the phenomena. In particular, the relation existing between the ice-formation and the air-temperature is brought out in the case of the Reschensee, while a comparative view is given of the duration and thickness of the ice in a large number of lakes for the various years from 1894–95 onwards. The concluding section, in which the influence of geographical position on the duration of the ice-period is discussed, is perhaps of most general interest, though the complexity of the interacting factors is too great for any very definite generalizations to be arrived at, beyond certain general principles which might to a certain extent have been deduced from *a priori* considerations. Other conditions being equal, the duration of the ice naturally varies, as a general rule, with the altitude and latitude of the lakes. Thus while Forel has shown that the lake of the great St. Bernard is frozen, on an average of 39 years, for 268 days in the year, Dr. Müllner found that a 29-years average gave a period of 153 days in the case of the Reschensee. A considerable variation is, of course, observable between different years, but this is found to be generally similar in the case of all the lakes, the degree of variation being, however, greater in the case of low-lying than of high-level lakes. The preponderating influence of the prevailing climatic conditions on the freezing of the lakes is brought out by a table which places the two sets of data side by side, and which shows that the influence of area and depth may be entirely set aside by weather conditions. Differences of geographical position, if accompanied by corresponding climatic differences, naturally exercise an important influence on the freezing and duration of the ice in the case of lakes of approximately equal area and depth. If, however, the volumes of the lakes vary, the phenomena will depend on the combined influence of depth, altitude, and latitude. Dr. Müllner concludes by noting that the available observations are not yet sufficiently complete to permit the solution of all the problems connected with the freezing of the lakes.

The Structure and Surface Features of Austria.—In connection with the recent meeting of the International Geological Congress at Vienna, a work was published on the structure and surface features of Austria, with a preface by Prof. E. Suess, which sums up with admirable clearness the broad characteristics of the

country from this point of view. Calling attention to the great variety displayed in the structural features of the country, the professor says, "Between the Moldau and the Danube rises one of the oldest mountain masses of Europe, which passes in the north in the more recently elevated arc of the Sudetian mountains and the Erzgebirge, and in the south into the Eastern Alps, which in turn are prolonged into the arc of the Carpathians. In front of this last is displayed to view, in the trough of the Dneister valley, a portion of the Russian platform, which has remained motionless for so long that even the Silurian rocks are there undisturbed. From the south-east the Dinaric chains approach the Alps, while traces of the old Rhodope massif runs through Eastern Servia towards the Save. Between the members of this great framework the plain extends, filled with marine and lacustrine sediments, which can be traced with unvarying characters down the Danube as far as Lake Aral, and which teach us that all the plains of South-East Europe have in the main been the theatre of a similar course of development. The present relief of Austria is the outcome of the denudation, dislocation, and ablation to which these elements—differing as they do in age, structure, and power of resistance—have been exposed during the long course of ages, and it has been the predisposing cause in moulding the characteristics of the people. And not only the relief, but the distribution of the natural wealth of the land has been dependent on its geographical constitution, as has also its division into forest, pasture, arable land, and steppe. Every charm and contrast of landscape is here present, from the blue rock-girt bay of Cattaro to the glaciers of the Alps, the forest tracts of the Carpathians, or the wide plains of the Bug. All the main formations of the geological series are here represented, all the more valuable ores and minerals are to be met with. . . . And, more important than all, wide tracts are covered with a black covering of humus of exceeding fertility."

The Elk in Norway.—In a recent number of the *Proceedings of the Zoological Society* (1903, vol. i. part 1), Mr. H. J. Elwes gives some notes on the present condition and habits of the elk in Norway, based on his experience while hunting the animal in North and South Trondhjem during six seasons. It appears that within the last forty years the elk has greatly increased in numbers, owing to the cutting down of the legal season for killing the animals, which now varies from fifteen days to a month yearly. Only four of the Norwegian provinces, all of them within the warm and wet climatic area on the south-west coast, are without elk, these being, however, just the provinces in which reindeer are most numerous. The range of the elk seems to be gradually extending northwards. North Trondhjem comes first as regards numbers, and, at least until recently, probably as regards the size of the horns. This province (and South Trondhjem in a less degree) is mountainous, barren, and thinly populated, covered with forests of birch, spruce, and Scotch fir up to about 2000 feet, and the elk are hardly disturbed, over large areas, during eleven months in the year. Their favourite food in summer consists of the twigs of birch, willow, and mountain ash, especially the last, and in winter of the bark and branches of the same shrubs, as well as the twigs of the Scotch fir. In summer they frequent the higher *fjelds* (to 2500 feet and over) to a much greater extent than is generally supposed. Mr. Elwes adds a note as to the supposed existence of a second species of elk from Siberia, holding that this is nothing more than inconstant variety of the European elk.

The Basin of the Ångerman River, Sweden.—Dr. Karl Ahlenius has chosen this basin for the subject of an anthropogeographical study. The drainage area is the second in northern Sweden, 12,590 square miles, that of the Torne river being more extensive, though a large part of it lies outside the boundaries of Sweden. The country is described according to the physical regions marked out

by Prof. Högborn (see vol. xxi. p. 75), and the gradual spread of the settlements up from the coast is investigated. Burial mounds, some dating back to the later Stone age, are mostly found in the coast lands near the bays and navigable waterways, the people there living chiefly by fishing and hunting in the woods. Barrows of a later type, containing iron implements, extend up the estuary of the Ångerman river to Solleftea. Fishing and hunting were still the chief pursuits, and cattle-breeding and agriculture of a primitive description were very gradually introduced. Hence the people still clung to the coast, and hence their name *angermæn* (men of the bays), from which the name Ångermanland is derived. With improved agricultural methods and systematic manuring of the ground, fixed settlements came into existence, many of which in the oldest registers (*Ångermanlands skattebok för* 1547) are compounded of *stad*, *hem*, and *by*. When the open lands and river-terraces in the lower valley had been occupied, the increase of population necessitated the burning down of the woods to form new fields, and there appeared farms with names ending in *böle*, *skog*, *säter*, and *land*. Cattle-stations, too, were formed, to which the cattle were driven in summer, and these tended to increase the area of cultivated lands, for as the manure could not be carried down to the farm, it was often utilized for new fields near the pastures. The clearing of the forest and the introduction of cattle-stations at a distance from the settlements was probably commenced about the year 1200, while the oldest stationary settlements date back to before the Viking age. At first only the coniferous woods in the valley were attacked, and it was not till the immigration of Finns in Central Sweden took place at the end of the sixteenth and the beginning of the seventeenth century that the more distant forests were invaded by settlers. Early in the eighteenth century saw-mills came into general use. Dr. Ahlenius also traces the spread of settlements in the upper valley between the falls and rapids, where *näs*, *ed*, *sjö*, *as*, *sel*, and *mo* appear in the names, indicating a later origin, though some settlements date from the end of the thirteenth century. The lake region seems to have been first occupied in the seventeenth and eighteenth centuries, and most of the settlements in the mountain region in the nineteenth, though some already existed in the eighteenth. The present distribution of settlements is also described, and their situation with regard to exposure and soil, a south or south-west aspect being preferred. A large amount of information has been collected in this pamphlet of 220 pages, which is illustrated by a number of maps. A few more place-names, which in most of the maps are entirely absent, would assist the reader to understand the text.

The Navigation of the Elbe.—The insufficiency of water between Hamburg and the sea for ocean-going steamers has long been a drawback to that port, especially at the time of unusually low tides and unfavourable weather. The German Government have accordingly decided upon carrying out an extensive scheme for correcting the course of the river so as to permanently increase its depth. This, it is estimated, will take some six or seven years to complete, and meanwhile it has been decided to deepen the most difficult section of the river, which is some 10 miles below Hamburg, by dredging. By this means it is hoped to obtain in about two years a uniform depth of 32 feet in the part of the channel referred to. An Elbe-Dneister canal system is also to be put in hand, to permit of traffic between the Black sea and the Baltic.

Diversion of the River Sele.—A scheme of considerable engineering magnitude is about to be undertaken in Italy. It has been decided to use the river Sele, which now flows into the Mediterranean near Salerno, for irrigation, and the contract for the work will be put up to auction on February 1 next. The river is to be tapped in the hills and taken over the other side of the watershed to irrigate the

lands on the eastern or Adriatic slopes—an undertaking requiring vast capital and great engineering skill.

Russian Railways.—It is stated that the Russian authorities are contemplating the construction of a railway to connect the European and the West Asiatic systems up to the Persian frontier. The new line in South Russia would pass through Vosnosensk, Nikolaiev, and Kherson to Jankoi. The Jankoi-Kertch line would then be extended on the other side of the straits to Anapa and Novorossisk, in order to make a junction with the Black Sea coast railway, which would have a branch by Erivan. The Black Sea coast railway starts at the station of Armavir, on the Vladikafkaz line, and is to be carried over the Goskh pass to Tuapse, and thence to Sukhum Kale. Still following the coast, the line will be extended to join the trans-Caucasian trunk line at Novo-Senaki, and will be brought as near Zugdidi as circumstances will admit. The effect of this line will be to tap the trade in cereals, which has hitherto found an exit at the port of Novorossisk, and shift the export to Sukhum, which is destined in the future to play an important part in commerce. Further railway developments are to be taken in hand in order to establish communication between the Siberian railway and the Northern Russian system. The excessive traffic at the points where the existing lines cross the Urals—at Kushva on the Perm line and at Zlatust—render further addition to it impossible, and hence it has been decided to construct a line *viâ* Kurgan, Shadrinsk, Ekaterinburg, Krasno-Ufimsk, and Cheptsy. The cost of the continuation is estimated at eight millions sterling. The length of the line is about 800 miles, and as it traverses the most fertile regions, it is likely to develop their agricultural capabilities and assist the mineral industries of the Urals. The Riazan-Volga railway is also to be extended to Astrakhan, a distance of 347 miles.

ASIA.

The Tea Industry in the Caucasus.—A recently issued Foreign Office report, by Mr. Consul Stevens, on the tea industry of the Caucasus (Misc. Series, No. 593, July, 1903), shows that the late extensive experiments in the cultivation of the tea plant in that region are likely to lead to decided success. The portion of the trans-Caucasus most favourable for tea-growing is said to comprise a belt along the Black sea, stretching from Sukhum in the north to the Turkish frontier in the south; climatic and other conditions preventing the zone from extending any great distance inland. The soil of the tea belt varies from a deep red clay to a light blackish earth, the lower hills being entirely covered with forests and brushwood, with a surface soil of loam more or less rich in humus; while the amount of good land that could not profitably be brought under plantation by terracing is relatively small. The climate is generally favourable, the rainfall averaging 96 inches per annum, while the heat is never very excessive. At times, however, droughts, deluges of rain, and frost and snow at the coast-line have done much damage. The bulk of the plants on existing plantations is pure China, but seed has also been imported from India, Ceylon, Java, and Japan. All kinds do well, but the China plant seems especially to thrive. The crop for the last two years has exceeded all expectations. The plantations of the Imperial Domains are under an experienced manager, and seeds and seedlings are furnished by the Domains to any persons desirous of taking up the cultivation, imported seed being no longer used.

The Flora of the Sundriban and its Origin.—A careful study of the flora of the Sundriban of the Ganges delta has lately been made by Major Prain in the Records of the Botanical Survey of India (vol. ii. No. 4). The paper is the outcome of a visit to the Sundriban in August, 1902, but the author has utilized the observations of his predecessors, especially Mr. Heinig and Mr. C. B. Clarke, and

is thus enabled to give a more complete account of the flora of the region than has yet appeared, while it is of special interest to geographers from the care taken to bring out the influence exerted by external conditions on the vegetation. The paper begins with a topographical description of the region, calling attention to the contrast between the western part—in which the rivers are not immediate distributaries of the Ganges, but are throughout subject to tidal influence—and the centre and east, where the rivers bring down enormous volumes of fresh water during the rains, and exercise a marked influence on the character of the vegetation. In the west and centre the islands are mainly forest-clad, while grassy savannas with cultivation form a large part of the eastern area. In the west the forests are mainly of the mangrove type, except towards the north, where, as in the central district, the prevailing species is the "Sundri" (*Heritiera minor*), which gives its name to the whole region. In describing the vegetation in detail, the author distinguishes between the clearings, whether existing or abandoned, and the swamp-forests. The former show plants introduced, either intentionally or by accident, through the agency of man. Many of them, particularly the mounds and platforms of higher ground which mark the sites of old clearings, as *e.g.* at Jatta, supply excellent examples of persistence under favourable conditions, the surrounding forest actually protecting the introduced plants against outside competition. The majority of the species in existing clearings do not occur in the swamp forests at all. Of the species occupying parts which have never been cleared, a distinction is drawn between those occurring on the sand-hills of the sea-face, and those of the muddy river-banks or swampy islands, nearly 40 per cent. of the former not occurring elsewhere in the Sundriban. Again, different parts of the swampy area are characterized by different forms, the riparian fence, *e.g.*, having its own special characters. Both the mangrove and "sundri" forest show a remarkable absence of undergrowth, another feature shared between them being the development of root-suckers, which in the case of some species produce a decided mechanical effect in holding together the mud. Different species vary considerably in their power to adapt themselves to a greater or less degree of brackishness. Inasmuch as the whole region is, geologically speaking, new land, all the species may be regarded as introduced, and an attempt is made in the paper to determine which of the possible agencies of transport have been most active in the various subdivisions. In the swamp forest man has naturally done little or nothing, the principal agents being the wind and the sea, while the species introduced by birds or by the washing down of their seeds by the great rivers are comparatively rare. The characteristic grass of the savannas (*Phragmites Karka*, var. *cincta*) also doubtless owes its introduction to wind agency. Of the sea-face flora two-thirds is of littoral type, and thus probably owes its introduction to the sea, though birds, the wind, and rivers have here too done something. The species of abandoned sites do not include any likely to have been introduced by the sea or by rivers, but, in addition to human agency, that of birds, especially fruit-eating birds, and in a less degree that of the wind, seems to have been operative. In the flora of existing settlements water-birds have probably made their influence felt more than elsewhere. The species introduced by man, either intentionally or inadvertently, have evidently come from the north and west, and a northerly origin seems assignable to those introduced by water-birds, and, naturally, by rivers. Those brought by fruit-eating birds, by the wind, and by the sea are, on the contrary, mainly characteristic of the Malayan region.

Japanese Expedition to Chinese Turkestan.—On August 16, 1902, a party of Japanese set out from England to explore the ruins of Buddhist temples in Chinese Turkestan. The leader was Mr. K. Otani, a Fellow of this Society, and

among the party was Mr. M. Hori, who had spent a year at the School of Geography at Oxford. From letters received at Oxford from Mr. Otani and Mr. Hori, the following brief abstract is compiled. The party left Osh, on the trans-Caspian railway, on September 8, 1902, and after thirteen days arrived at Kashgar, most of the party suffering from mountain sickness on the Terek Davan. From Kashgar they went to Tashkurgan, where, owing to the lateness of the season and the need for being in Japan early in 1903, it was necessary for the party to break into two, Mr. Otani traversing the mountains to India, leaving Messrs. Hori and Watanabe to carry on the explorations in the Tarym basin. From Tashkurgan Messrs. Hori and Watanabe crossed by the Khandar Davan (16,540, Deasy) on yaks, reaching Yarkand in nineteen days, and after a fortnight's stay they left for Khotan, where they spent six weeks, working hard at Turki and Chinese. On New Year's day 3 or 4 inches of snow fell at Khotan, and on January 2, 1903, they began the hardest part of their travels—the journey down the Khotan darya to Aksu, which took twenty-three days. Meteorological observations were taken three times a day; the range of temperature observed was from −36° Fahr. to +31° Fahr. The cold was so great that they could not get to sleep in the tent, yet five of the native followers always managed to do so outside, round the fire, with a fur coat thrown over their heads. From Aksu the party returned to Kashgar, and on March 5 started for Kucha *viâ* Aksu and Bai, a journey which nominally occupies twenty-five days, but for which they took over two months, owing to a number of *détours*. Over three months were spent at Kucha, from which centre numerous expeditions were made to all the interesting places in the neighbourhood. Mr. Hori writes, "Kucha is, I think, the most interesting place in Chinese Turkestan for the traveller, because of the abundance of religious and historical ruins. We visited seven Min-Ui (= 1000 houses) of Buddhist temples and many other ruins in the circle of two days' march from Kucha." Messrs. Hori and Watanabe expected to reach Urumtsi before the end of September, and ultimately to pass through China by Hankou, where they hope to be about the end of the year.

The Orographical Features of Korea.—Our knowledge of the physical geography of the Korean peninsula is so imperfect that the attempt which has been made by the Japanese geologist, Dr. B. Koto, to trace the main outlines of the structure-lines of that country in the *Journal of the College of Science*, Tokyo (vol. xix. art. 1, 1903), is particularly valuable. During a recent visit to Korea, Dr. Koto traversed the peninsula in all directions, and the basis of actual scientific observation thus obtained marks a new step towards a more accurate knowledge, even though in points of detail the views put forward may be still to a large extent speculative. Dr. Koto draws a forcible parallel between Korea and the Italian peninsula as regards the principal external features, both being divided off on the north by transverse ranges sinking to a well-marked lowland, although, as he points out, there are naturally many differences, both in respect of outer form and geological structure. Thus, while in Italy, the Apennines run along the central axis of the country, in Korea the principal mountains occur on the side of the Sea of Japan; and whereas Italy is not wanting in young geological formations, Korea is mainly composed of archæan and palæozoic rocks. It may be divided on many grounds into two well-marked sections, a northern and a southern, separated by the trench or depression of Chyuk-ka-ryong, which affords the easiest passage across the peninsula from the Sea of Japan to the Yellow sea. The two sections differ alike in their history, climate, topography, and people. The "Han-land" (South Korea) is hilly, though lofty mountains crown the coast of the Japanese sea. In North Korea two top graphic types can be distinguished, the one being the Kaima plateau in the north, the other the old Chyo-Syon land, a hilly region, but with an

average elevation considerably lower than that of South Korea. Dr. Koto distinguishes five main systems of structure-lines. The first, which he classes with the Sinian system of South China, as originally traced by Pumpelly, consists of broad folds of archæan formations, running from south-south-west to north-north-east, or from south-west to north-east, and occupying nearly half the area of the peninsula. To the north-east the folds appear to unite with the structure-lines of the Sikhota-alin. A second system, contemporaneous or a little later, trends from west-south-west to east-north-east (or in the case of the celebrated Chang-pai-Shan, from west to east) in the Kaima land, and forms apparently the direct continuation of South Manchuria. This is described as the Liau-tung range or system. Thirdly, a very characteristic system runs generally north and south along the axis of the peninsula. This Dr. Koto calls the Korean system, which is remarkable as seeming to be not matched, in its direction, by any other mountains of South-East Asia. It is divisible into two natural subgroups. Next comes the Han-san range, on the southern margin of the peninsula. It is of later age than the Korean system, but its influence is to be traced, jointly with that of the Korean folds, in the peculiar features which characterize this southern coast. Lastly, a great number of small ridges or fault-scarps traverse like a gridiron the whole of the Chyo-Syon land, breaking it up into a number of long orographic blocks, mainly of grey tabular limestone. They seem to be the after-effect of the great tectonic disturbances which gave to the crust-block of the peninsula its present form. The paper is accompanied by an excellent map, in which the main structural lines are laid down. Dr. Koto has also done good service by compiling an extensive list of Korean place-names, with their Romanized spellings. This has been issued as a separate publication.

Navigation of the Yang-tse-kiang.—Writing on the subject of trade development on the Yang-tse, the British consul at Chungking expresses the opinion that through steamers between this town and Ichang are probably not feasible from a commercial point of view, the river between Ichang and Kwei-fu being difficult, and the conditions varying so greatly between the winter and summer months. He considers, however, that specially built steamers might profitably run during the greater part of the year between Wanhien, Chunking, and Suifu, and visit the northern tributaries in summer months. H.M.S. *Woodcock* visited Suifu, and passed into the Min river as far as Kiating two years ago. Next summer she reached a point 40 miles above Kiating, and on the Yang-tse main stream arrived at Ping-Shan, the highest point of navigation for junks. She also ascended the Kialing, reaching a point about 80 miles from Chungking. It is probable that no development of the Suchuan trade will take place without better means of communication. At present goods destined for Chunking have to undergo three transhipments, and from Ichang have to be hauled up in a small junk by trackers, a journey of some five or six weeks at low water.

AFRICA.

German Expedition to the Upper Benue and Lake Chad.—This expedition, to which brief reference was made in the *Journal* for June last (p. 676), returned to Lokoja in July, after successfully accomplishing the main tasks entrusted to it. After completing its work on the watershed between the Benue and Shari basins, it proceeded north to Lake Chad, going north *viâ* Dikwa and returning by a more easterly route by the Logone. Here there was naturally less to do from a purely geographical point of view, and the attention of its leader, Herr Bauer, was directed rather to a study of the economic possibilities of the land. His conclusions were summed up in the *Deutsche Kolonialzeitung* for July 23

last. Especially was he struck with the large production of corn in Bornu, large areas being described as veritable cornfields. The production is much above the needs of the inhabitants, and a considerable amount is exported. The Bornu natives (by whom this cultivation is carried on) appear to have made a favourable impression, and not only is the proportion of those able to read and write said to be greater than among the Fulbe, but the knowledge of the people is better grounded than among the latter. Herr Bauer considers that the views of Colonel Pavel with regard to the trade of Dikwa were somewhat over-sanguine, for, owing to recent changes in the trade-routes from Southern Adamawa, its market has much declined in importance, while the amount of European goods brought by the Tripoli merchants has also fallen off. Ostrich feathers are the one important article of export, but the trade in these is very considerable. Gulfei, on the Shari, is, however, the centre of the ostrich-farming district, and is the point on which European enterprise should be directed. From an agricultural point of view Herr Bauer is disposed to rate highly the possibilities of German Bornu. In a later number of the *Kolonialzeitung* (No. 40, October 1) a report appears by Herr Edlinger, a mining engineer attached to the expedition, on the geographical and geological results of the expedition so far as they relate to the Upper Benue region. The route chosen on the outward journey to Ngaumdere followed more or less closely the eastern and south-eastern watershed of the Benue on the side of the Logone, and thus helped to define it more precisely than hitherto. North of 8° the basin extends beyond 15° E. Its south-eastern border is very mountainous, the highest summit measured being a double-peaked granite ridge, which was named the Sachse-Spitze (4395 feet). Nearer Ngaumdere the conical peaks of the Ngau Mbum were thought to reach 5500 feet. The water-parting follows a line of high ground running west-south-west and east-north-east, which seems to fall in a steep escarpment to the north. To the south of it, the Mao Mbina, perhaps the most important head-stream of the Logone, flows for a distance in a parallel direction. The principal source of the Benue seems to be at the point where it was placed by Flegel and Passarge, but the elbow which has been marked on the maps between 8° and 9° N. does not seem to exist. The main eastern feeder of the river is the Mao Shufi, brought to light for the first time by the expedition. At Garua the Benue had a breadth of 200 yards and a depth of 2 feet, but in the rains it rises 10 to 13 feet, and the width extends to 500 yards. A full report on the geology of the country will be issued when the collections have been examined, but meanwhile some notes are given. In the orientation of the ranges the directions observed by Passarge (west to east and north-north-east to south-south-west) seemed to prevail. Gneiss and granite play an important part in the structure of the country, the Benue sandstone (interspersed with some conglomerate) being the only sedimentary formation represented. No signs of valuable minerals were found, but this is attributed to the difficulties in the way of a thorough examination while on the march.

M. Chevalier's Explorations on the Borders of Darfur and Wadai.—We have already given an outline (*ante*, p. 85) of the first results obtained by M. Chevalier in his explorations in the Eastern Shari basin, as described by him in a communication printed in *La Géographie*. In the August number of the same periodical a further letter is printed, which sketches the geography of the more northern districts traversed by the expedition, which, as already mentioned, penetrated to the previously almost unknown region immediately to the south-west of Darfur. The slight first-hand information previously possessed about this region was due to the Journeys of Potagos from the east and Hanolet from the south, while a certain amount of native information, not always easy to piece together,

had been collected by earlier travellers in Darfur and Wadai. Although the fact is not mentioned by M. Chevalier, it is interesting to find that the name Dar Kulla, spoken of more than a century ago by Browne, with the river flowing westward through it which gave rise to so many speculations at the time of Mungo Park's last journey, finds a place on the sketch sent home by the traveller in the form Dar Gulla, the river appearing also as the upper course of the Auk, one of the northern branches of the Shari. From a hydrographical point of view, this region is of much interest. The sandstone plateau, of an altitude of 2000 to 2800 feet, which occupies the meeting-ground of the Shari, Congo, and Nile basins, falls to the north to a plain some 400 feet lower, covered with a monotonous vegetation, which in turn sinks gradually to a vast annually inundated tract, measuring some 140 miles by 50. This is the plain of Mamun, with an altitude of about 1500 to 1600 feet, through which the streams that rise in the southern plateau run in many interlacing branches. All these watercourses finally unite to form the so-called Auk, a name used by Nachtigal for this branch of the Shari, but which really represents the generic term for river ("Au") in the Tunga language. The principal branch is said to be the Bungul, which, when full, occupies a bed over 12 feet deep, and spreading to a width of 300 to 500 yards. According to M. Chevalier's sketch, the more northern branch, the Minja of Potagos, has a still longer course, and carries the Shari basin eastward to about 23°. M. Chevalier thinks that the Auk might be ascended during winter by boats of some size. During the rains this whole region becomes a vast lake filled with aquatic vegetation, from which the slightly elevated pieces of ground rise as more or less wooded islands. The district simply swarms with large mammals, and water-birds also abound. The vegetation is that characteristic of the Sudan, including species of *Diospyros*, *Terminalia*, *Combretum*, etc. The country, however, is a poor one, and the Gulla people (who belong to the Bagirmi stock) would before this have disappeared before the raids of the people of Wadai and Darfur, were it not for the refuge afforded by the marshes and annual inundation. Taken as a whole, the countries east and south of Wadai are said to possess only a moderate value. Rubber is almost entirely absent, and the inhabitants have suffered much from the incursions of the Mohammedans, who, so far from introducing civilization, have only left traces of their oppression.

The Transkei Gap.—An interesting paper on the striking morphological feature in South Africa known as the Transkei gap, by Messrs. Rogers and Schwarz, of the Geological Survey, is printed in a recently issued part of the *Transactions of the South African Philosophical Society* (vol. xiv. Part i. 1903). The so-called gap is a valley or trough running in a nearly straight line from east to west through the country, and due, not, like a "rift-valley," to the sinking of a strip of country between vertical faults, but to the intrusion into the sedimentary rocks of the district, and subsequent weathering, of a vertical dyke of an easily decomposed crystalline rock allied to diorite. It is suggested that the Beagle channel south of Tierra del Fuego may have owed its origin to a similar cause, for were the Transkei gap to be carried below sea-level, a very similar appearance to that described by Darwin would be produced. Although the term "gap" seems hardly applicable to such a feature, it is pointed out that the actual appearance of the valley quite gives the impression that the Earth has gaped or opened. The gap is reduplicated in several places, and there is an offset at right angles to the general direction. It has been traced from the sea at the mouth of the Kogha river for a distance of 50 miles, and is apparently continued across the Kei river into the Cape Colony for an equal distance. A striking feature is the arrangement of the streams within the gap, which often crosses by low "necks" from one valley to another, even while it maintains a straight course. This is best marked in the section

between the Kobongaba river and the Nxaxo pass. Before the formation of the gap-valleys the rivers appear to have wandered over the surface of the plateau, into which they have since cut deep trenches by reason of the gradual elevation of the land. It was during this elevation that certain of the minor streams took the course followed by the dioritic dykes, which offered the least resistance to the erosive forces to which they were subjected.

Climatology of St. Helena.—The only meteorological station in St. Helena is placed about 1900 feet above sea-level, and records are taken only once a day. The total rainfall for the year past was 34·74 inches—nearly 4 inches below that of the previous year. Rain fell on 254 days, but the greatest fall in one day did not exceed 1·41 inches. June, July, and August are the wettest months. The prevailing wind ranges from east-south-east to south-east, and on only seven days was it recorded as calm. The highest maximum shade temperature was 78°, on February 6; the lowest minimum 62°, on September 1.

AMERICA.

Stream Contest along the Blue Ridge.—The Blue Ridge, appropriate enough as a name in Northern and Central Virginia, is not truly descriptive of the heights along which the divide between the Mississippi and Atlantic rivers runs in the south of Virginia and in North Carolina, which is an escarpment descending from the hilly and mountainous upland of the western drainage area to the rolling and hilly lower land of the eastern streams. The shorter eastern streams with steeper gradients are rapidly cutting their valleys and pushing the divide eastwards. Special instances are studied by Prof. Davis in the *Bulletin* of the Geographical Society of Philadelphia (III. No. 5, April, 1903). This retreating escarpment, unlike that of the Cotswolds, is essentially independent of structure, for it is carved in a body of heterogeneous and disordered crystalline schists whose variation in resistance to weathering has only a secondary influence on the topographic form, and the escarpment is due, according to Mr. Davis, mainly to the land surface being degraded to a lower level by the short rivers of the Atlantic system than by the long rivers of the Mississippi system. This differs from the explanation of Messrs. Hayes and Campbell, who consider it the result of retrogressive erosion on the steeper eastern side of a tilted peneplain (cf. *Nat. Geog. Mag.*, vi. (1894), pp. 75, 76).

The Geography of Boston, U.S.A.—In connection with the meetings of the National Education Association at Boston in July last, the *Journal of Geography* issued a special number, devoted entirely to the Geography of Boston under its various aspects, which supplies an instructive lesson on the influence of geographical environment on the growth and fortunes of a centre of human activity. The first two papers, by Profs. R. E. Dodge and G. H. Barton, sketch the general characters of the site of Boston and its surroundings, showing how the present surface features are the outcome of the action of the old ice-sheet on previously existing topography, and how the striking character of the coast has influenced the economic development of the site. Of the major topographic features, the drumlins, formed by the accumulations of the Glacial period, play an important part in determining the picturesque scenery of the Boston basin, almost all of the islands in the harbour, as well as the main features of the neighbouring mainland, owing their present form at least to this cause. Other papers describe excursions in and around Boston, the Boston Park system, Boston as a centre of industry, and the geographic development of the city, the last two being especially instructive. It is pointed out that of the three lowlands of weak rocks lying on the border of the hard rocks of the New England upland, and forming the sites of the three cities of Boston, Providence, and New Haven, the Boston basin alone looks towards Europe, and was

thus naturally the centre of the great Puritan immigration. It became "the largest of many important colonial seaports; it supplied the capital and leadership for establishing large interior factory cities at convenient water-powers; it was the natural centre for railroads, and largely shared in building them. As a result, it became the best port for importing the raw materials of manufacture, the natural centre for the head offices and sales agents of New England corporations, the port for exporting goods to other lands and shores." Many of the main streets of old Boston mark geographic features formerly of importance, but now almost forgotten, while in its development Greater Boston shows in a marked degree the influence of its physical geography. "The hills, valleys, islands, marshes, estuaries, etc., have helped or hindered the settlement and growth of the many village sites which are now included in metropolitan Boston." A series of maps shows the extent of settlement at various periods from 1650 onwards. Already at that date many sites had been chosen around Boston bay, so that "there were a large number of towns around the central 'hub' at the foot of the three mountains which were later to be taken in to form the spokes of the wheel of Greater Boston." Old Boston was at first very much isolated from the surrounding towns, the only connection on land being the neck on the southern side, but by 1800 bridges had supplied a connection with Cambridge and Charlestown, in the west and north. Among other results of the natural conditions of the site is the extensive modern system of parks and reservations, which now cover an enormous area, and have to a great extent been kept in their natural state. By its symmetrical arrangement of hills and rivers, a more or less orderly distribution of highways and buildings, and consequently of open spaces for recreation, has been brought about, the ground forbidden to the trader and builder affording unequalled advantages for the latter purpose. An unusual feature is also the system of "park-ways" which tie the various reservations to each other, and bring them within reach of the people of the cities.

The "Guns" of Lake Seneca.—A short note on a phenomenon of detonation in Lake Seneca, New York, apparently analogous to the famous "Barisal guns" of the Ganges delta, the "mistpoeffers" of the North sea, and the like, appears in the *Monthly Weather Review* for July last (p. 336). Writing from Dresden, Yates county, New York, Mr. W. A. Prosser says that the "guns" of Lake Seneca are evidently caused by gas escaping from the sand at the bottom. Off Long point on the west side of the lake the water is very deep. Heavy currents pass either north or south at regular intervals, and a heavy wind for a few hours will change the position of the extreme point by several rods. When the swell is not too heavy, the gas can always be seen rising in bubble form, while natural gas is found in considerable quantity within 3 or 4 miles. The editor remarks that it may well be that the "Barisal guns" have their origin in a similar escape of gas.

MATHEMATICAL AND PHYSICAL GEOGRAPHY.

Secular Variation of Rainfall.—Dr. Hann contributes a valuable discussion of the long series of rainfall observations which have been made at Padua (1725–1900), Milan (1764–1900), and Klagenfurt (1893–1900) to the *Sitzungsberichte der Kaiserlichen Akademie für Wissenschaften* (*Math. Naturwiss. Classe*, cxi.). Even with bloxamed means he can find no connection between the sun-spot period of eleven years and the variations in rainfall, but, on the other hand, there is distinct evidence of the thirty-five year periodicity which Brückner of Bern first expounded. The periods are 1626–60, 1761–95, 1796–1830, 1831–65, 1866–1900, the mean of the dry periods being 1738, 1773, 1808, 1843, 1878, (1913), and of the wet periods 1753, 1788, 1823, 1859, 1893, (1928); but the Paduan figures require to be shoved forward ten years to agree with those of the others.

The Original Home of the Tiger.—In a note printed in the *Proceedings of the Zoological Society* (1903, vol. i. part i.), Colonel C. E. Stewart suggests that the tiger was originally not a native of India, but a purely northern animal, which has gradually extended its range southward. He points out that while Sanskrit possesses a word for "lion," it has none to designate the tiger, and that apparently no allusion to a tiger in India can be traced to a period anterior to the early Mohammedan conquerors. No allusions to tiger-hunts occur in the monuments of the kings of Assyria or Persia, while, though Marco Polo mentions the tiger, he does not speak of it as an Indian animal. The absence of the tiger from Ceylon indicates, in his opinion, that there were no tigers in India prior to the separation of the island.

A Sixteenth-century Globe.—We have received from the well-known bookseller, Herr Ludwig Rosenthal of Munich, an extract from his catalogue describing a sixteenth-century globe now in his possession, with a reproduction in the form of gores of the features delineated on it, as well as a photograph of the globe itself. The globe, which has not been long known to geographers, was briefly described, from a hasty inspection, by M. Harrisse, in the *Revue de Géographie* for September, 1895 (vol. 37, p. 175), the same writer adding notes on other somewhat similar globes, which had likewise been newly brought to light, in the same journal in the following year. Herr Ludwig's reproduction permits a more exact idea to be formed of the character of the globe, and its delineation of the world as known at the time of its construction. As stated on the globe itself, it was made in 1530 by Robert de Bailly, and is chiefly remarkable as among the earliest geographical documents to show the results of Verrazzano's voyage of discovery, the part of North America visited by that navigator being named on it "Verrazzana." In its representation of Central and North America it follows the type of which the map by Vesconte de Maiollo (1527) is the best-known example (see reproduction of the latter in Weise's 'Discoveries of America,' 1884). The globe is noteworthy, also, for its delineation of the supposed southern continent, which is very similar to that of the well-known double cordiform map of Orontius Finaeus (1531), the inscription "Brasielie Regio" appearing, as on the latter, to the south of the Indian ocean, though the large projecting land-mass inscribed by Finaeus as "Regio Patalis" is not to be seen. For Southern Asia the Ruysch type is followed by both De Bailly and Finaeus, though the former differs in separating (as does Maiollo) Asia from America by a broad tract of ocean. As on other maps of the period, the Asiatic inscription "Catticora" has, however, remained attached to South America. It may be noted that, though Hakluyt in his "Particular Discourse" (1584) refers to a globe showing Verazzano's discoveries as existing in "the Queen's privie gallery at Westminster," this can hardly have been the one above described, as it was thought by Hakluyt to have been of Verrazano's own making, and had, besides, inscriptions in Italian, whereas those in De Bailly's globe are in Latin.

GENERAL.

The R.G.S. Syllabuses of Instruction in Geography.—It has for some time been felt by those interested in the improvement of geographical teaching, that some authoritative guidance in regard to the methods and courses of study most applicable to the end in view is very desirable. The want has now been met through the action of the Council of the R.G.S., which, in response to requests from various teaching bodies, has issued two syllabuses, the one intended as a guide to geographical teaching in elementary, the other in secondary schools. The work

on the first syllabus, which had been undertaken by the late Mr. T. G. Rooper, has since his regretted death been completed by Mr. G. G. Chisholm, while the secondary syllabus has been prepared by Mr. H. J. Mackinder. After preliminary remarks on the function of geography, the elementary syllabus sketches the various stages by which the study of geography should progress during the passage of the child through the school until the age of 14, or thereabout, is reached. In the syllabus for more advanced study, Mr. Mackinder plans a course suitable for pupils between 13 and 17, the arrangement of the pupils in sets for the special purposes of this branch of study being recommended. The need for problem-solving in geographical study, and the value of setting of essays involving a knowledge of physics, or mathematics, and history, as well as geography, are pointed out, as is also the importance of bearing in mind that "nothing should be taught as an isolated fact, and yet that the line of argument should be so chosen that in the end every essential fact of the World's geography, which should be known to an educated man or woman, would have been learnt in its due setting of related facts, and in its proper perspective."* The syllabuses are suggestive, and not dogmatic. They attempt to guide the teacher preparing the course for his own classes by indicating the essential points, and at least one sequence or presentation of educational value; and it is hoped that the suggestions will be of service especially to teachers who cry out that too much is demanded of them—that they have too wide a subject and too little time for it. If the new effort of the R.G.S. to improve geographical teaching does nothing more, it should convince such teachers that a wide subject can be successfully dealt with only by carefully planning the course, so that there is a progressive development of the quality of the work, as well as increase in the quantity of the topographical knowledge. The great fault of most geographical courses at present is that the more advanced classes deal only with the more remote regions, whereas they should tackle the more advanced problems whether of lands near or far. When this is done, and due attention is paid to regular observational and practical exercises, geography will prove to be so valuable an educational discipline that if more time is needed for it that time will be granted. Teachers of geography have first of all to show that it is worth more than the time allotted to it at present. This report will help them to do so.

OBITUARY.

John Allen Brown.

John Allen Brown, who passed away September 24, at his residence in Ealing, aged seventy-two years, became a Fellow of our Society in 1861, the year in which his father, John Brown, died, whose membership dated back to 1837, and his obituary notice appears in the *Gentleman's Magazine* of May, 1861. The interest in his father's Arctic and Antarctic literary work was continued as a filial duty by his sons, the eldest of whom is the subject of our present memoir, but it was as a geologist and anthropologist, rather than as a geographer, that he made his name

* A fuller account of Mr. Mackinder's views will be found on p. 549, and in the *Geographical Teacher* for October.

known in scientific circles. The work to which he devoted the leisure of many years, the antiquity of man, has been preserved in numerous papers on the subject of the evidences supplied by his own discoveries of flint implements, of which he leaves an important collection, and it was his pride and pleasure to show his museum of these treasures to any one who showed an interest in this very practical department of the records of pre-historic man. His desire to connect the palæolithic and neolithic periods by a term which should be applicable to those implements coming between the roughly-fashioned flint and the chipped and polished implements was the outcome of a long investigation of the subject, and his proposed *mesolithic* period will no doubt be accepted for purposes of classification. Allen Brown was not a man to sit still and let life pass in casual engagements, his capacity for work leading him years ago to promote free libraries, to literary productions, and lectures on his particular studies. He was a member of the Geological Society and the Anthropological Institute, and a Justice of the Peace for the county of Middlesex.

D. W. KETTLE.

CORRESPONDENCE.

Relief Maps and Globes.

Mount Vernon, New York, East Fourth Street.

I HAVE read with much interest Prof. Reclus's address on the subject of relief maps and relief globes, and an experience of twenty years leads me to agree pretty closely with his conclusions. During the time in which I have been working upon the matter, however, my own opinions as to the use and value of relief maps and models have materially changed. My first impressions were that all reliefs should be rigidly true to scale—that is, there should be no vertical exaggeration. The experience of many thousand teachers, in the course of three or four years, convinced me that in many instances such a plan was untenable. In other words, when young children are to be considered, the logical is not always the psychological. The sense-perceptions of pupils ten or twelve years of age are not so keen as those of adults, and slight differences in relief, which mean much to the latter, mean nothing to the former.

After making this discovery, I was not slow to change my plan. The first model constructed on the new plan was a relief of South America. It was made by the brothers Mindeleff of the United States Geological Survey, both of whom were not only topographers of note, but artists as well. The vertical exaggeration was 10 : 1, and, although it pleased the thousands of teachers who used it, I am constrained to say that I think the vertical exaggeration was greater than necessary. Mr. Alfred Russel Wallace condemned it in this respect.* The models subsequently constructed had a vertical exaggeration of 5 : 1. This, I am inclined to think, is about right for Asia, but rather too great for Europe.

And here is the point I wish to make: the model of a very large area demands a vertical exaggeration varying from 2 : 1 to 5 : 1; the models of small areas need none. Moreover, when we consider the fact that the sense-perceptions of young pupils are not fully developed, I see no impropriety in using more than one vertical

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* Dr. Tyndall saw no objection to it.

scale in the same model. In literature truth is often inculcated by fiction; in the training of the sense-perceptions it may be properly inculcated by exaggeration The experience of many thousand teachers gathered during a score of years in educational work is far better evidence to me than all the logic and arguments of the college and university men to the contrary. The child is instructed by what he can discern, and not by what he cannot discern.

The foregoing, it is hardly necessary to say, applies to the younger pupils of the elementary schools. For older pupils who have been taught to conventionalize, the contour map is generally preferred by teachers to the relief map or the model. Such pupils have been taught to use the imagination, and they are generally able to get correct mental pictures from the conventionalized map. The elaborately finished model, which is designed to show physiographic processes and effects, however useful it may be in the university laboratory or the museum, has no place in the elementary school. It may be added that any relief or model that gives untrue character to topography should be instantly discarded. Unfortunately, much freakish topography that has no likeness in nature has been foisted upon schools both at home and abroad.

A good relief globe that can be furnished for a low price is something greatly to be desired, and if Mr. Patterson's globe can be manufactured so as to be sold for, say, two pounds, I am inclined to think the venture of making and marketing them will be a good one. I see nothing to prevent its being done at the figure quoted, and the good results that will arise from the use of such globes cannot be questioned. As a matter of fact, while we go through the dry formality of mentioning a round earth early in the pupil's course of study, we hustle him through a world that is absolutely flat, and bury him under the surface of it when he is dead.

JACQUES W. REDWAY.

The Pangong Lake.

20, Wellesley Road, Gunnersbury, October 5, 1903.

In the March number of the *Geographical Journal*, p. 257, Dr. Sven Hedin says that the Pangong lake formerly belonged to the basin of the Indus. I think he must have intended to say the basin of the Shayok, for it does not lead into the Indus basin until 200 miles lower down, and is in a valley parallel to that of the Indus, but about 50 miles to the north of it, with very high mountains between.

Dr. Sven Hedin also says that the water of the Pangong lake is slightly salt. The fact is that there are two, or rather three, Pangong lakes, the upper two being fresh and draining into the lowest one, which, having no outlet, is salt. In 1871 Sir Edward Frankland analyzed for me some water taken from the lowest lake; the detailed result is given at p. 370 of 'Lahore to Yarkand,' the total salts being 1297 parts in 100,000, chiefly sulphate of soda and chloride of sodium.

GEO. HENDERSON.

Cheap Ordnance Survey Maps for Teaching Purposes.

School of Geography, Oxford.

May I through your columns call the attention of your readers to an important concession which has recently been made to schools by the Board of Agriculture? Most teachers know how necessary Ordnance Survey maps are for sound class teaching in local geography, but the price has hitherto been prohibitive. In response to memorials from various sources, the Board of Agriculture has now

issued instructions that special editions of the one-inch outline sheets be supplied to educational authorities at the following prices: 200 copies, £1 5s.; 500 copies, £2; 1000 copies, £3; 5000 copies, £12. For larger numbers the estimated price would be £2 per 1000 copies. The only stipulation made is that on no account are the maps to be sold. It is universally agreed that all sound geographical teaching must begin in a study of the home region, and it is therefore to be hoped that most teachers will avail themselves of the facilities so generously granted, either individually or by making application through the local education authority.

A. J. HERBERTSON,
Hon. Sec. Geographical Association.

GEOGRAPHICAL LITERATURE OF THE MONTH.

Additions to the Library.

By EDWARD HEAWOOD, M.A., *Librarian*, R.G.S.

The following abbreviations of nouns and the adjectives derived from them are employed to indicate the source of articles from other publications. Geographical names are in each case written in full:—

A. = Academy, Academie, Akademie.
Abh. = Abhandlungen.
Ann. = Annals, Annales, Annalen.
B. = Bulletin, Bollettino, Boletim.
Com. = Commerce.
C. Rd. = Comptes Rendus.
Erdk. = Erdkunde.
G. = Geography, Geographie, Geografia.
Ges. = Gesellschaft.
I. = Institute, Institution.
Iz. = Izvestiya.
J. = Journal.
k. u. k. = kaiserlich und königlich.
M. = Mitteilungen.
Mag. = Magazine.
Mem. = Memoirs, Mémoires.
Met. = Meteorological.
P. = Proceedings.
R. = Royal.
Rev. = Review, Revue.
S. = Society, Société, Selskab.
Sitzb. = Sitzungsbericht.
T. = Transactions.
V. = Verein.
Verh. = Verhandlungen.
W. = Wissenschaft, and compounds.
Z. = Zeitschrift.
Zap. = Zapiski.

On account of the ambiguity of the words *octavo*, *quarto*, etc., the size of books in the list below is denoted by the length and breadth of the cover in inches to the nearest half-inch. The size of the *Journal* is 10 × 6½.

A selection of the works in this list will be noticed elsewhere in the "Journal."

EUROPE

Alps. *Jahrb. Schweiz. Alpenclub.* **38** (1902–1903): 299–326. **Forel, Lugeon, and Muret.**
Les variations périodiques des glaciers des Alpes. Par Dr. F. A. Forel, Dr. M. Lugeon, et E. Muret. Vingt-troisième rapport.—1902.

Alps. *Jahrb. Schweiz. Alpenclub.* **38** (1902–1903): 231–243. **Knonau.**
Die Alpen im Kriege des Konsuls Bonaparte gegen die Kaiserlichen im Frühjahr 1800. Von G. Meyer von Knonau.

Austria. *T. Edinburgh Geolog. S.* **8** (Special Part) (1902–3): pp. x. and 180. **Gordon.**
The Geological Structure of Monzoni and Fassa. By Maria M. Ogilvie Gordon, D.SC. *With Maps, Sections, and Illustrations.*

Belgium—Lesse. **Van den Broeck and Rahir.**
Mém. S. Belge Géologie **17** (1903): 119–144.
La Lesse souterraine. La traversée des deux boucles de la rivière à Furfooz démontrée au moyen de la fluorescéine. Par E. Van den Broeck et E. Rahir. *With Map and Illustrations.*

English Channel—Sailing Guide. **Jenkins.**

The Pilot's Guide for the English Channel; comprising the South Coast of England, and general directions for the navigation of the Channel. Edited by H. D. Jenkins. London: Imray, Laurie, Norie, & Wilson, 1903. Size 9½ × 6, pp. vi., xvi., and 190. *Charts, Plans, etc. Presented by the Publishers.*

France. *B.S.G. Lille* **40** (1903): 11–19. **Malotet.**

Le pays de l'Oise moyenne et de la Haute-Somme Vermandois. Par A. Malotet.

France—Map. *Ann. Club Alpin Français* **29** (1902): 513–529. **Arnaud.**

Appendice complémentaire et explicatif de la carte de l'État-Major. Par F. Arnaud, suivi d'une lettre de Maurice Paillon.

France—Seine-et-Oise. *C. Rd.* **137** (1903): 279–281. **Dollfus.**

Sur les effondrements de la plaine de Sevran. Note de G. F. Dollfus.

Germany. **Hellmann.**

Regenkarte der Provinzen Hessen-Nassau und Rheinland sowie von Hohenzollern und Oberhessen. Mit erläuterndem Text und Tabellen. In amtlichem Auftrage bearbeitet von Prof. Dr. G. Hellmann. Berlin: D. Reimer, 1903. Size 10½ × 7, pp. 56. *Map.*

Germany. *Forsch. deutsch. Landes- u. Volksk.* **14** (N. 6) (1903): 517–676. **Wagner.**

Die Bevölkerungsdichte in Südhannover und deren Ursachen. Von Dr. E. Wagner. *With Map.*

Germany—Baltic Coasts. **Wegener.**

Deutsche Ostseeküste. Von Georg Wegener. (Land und Leute. Monographien zur Erdkunde, vii.) Bielefeld and Leipzig: Velhagen & Klasing, 1900. Size 10½ × 7, pp. 168. *Maps and Illustrations. Price 4s.*

Germany—Bavaria. **Haushofer.**

Oberbayern, Munchen, und bayerisches Hochland. Von Prof. Dr. Max Haushofer. (Land und Leute, Monographien zur Erdkunde, vi.) Bielefeld and Leipzig: Velhagen & Klasing, 1900. Size 10½ × 7, pp. 120. *Map and Illustrations. Price 3s.*

Germany—Berlin. **Zobeltitz.**

Berlin und die Mark Brandenburg. Von Fedor von Zobeltitz. (Land und Leute. Monographien zur Erdkunde, xiv.) Bielefeld and Leipzig: Velhagen & Klasing, 1902. Size 10½ × 7, pp. 192. *Map and Illustrations. Price 4s.*

Germany—Harz. **Günther.**

Der Harz. Von Fr. Günther. (Land und Leute. Monographien zur Erdkunde, ix.) Bielefeld and Leipzig: Velhagen & Klasing, 1901. Size 10½ × 7, pp. 128. *Map and Illustrations. Price 3s.*

Germany—North Sea Coasts. **Haas.**

Deutsche Nordseeküste, Friesische Inseln und Helgoland. Von Prof. Dr. H. Haas. (Land und Leute. Monographien zur Erdkunde, viii.) Bielefeld and Leipzig: Velhagen & Klasing, 1900. Size 10½ × 7, pp. 176. *Map and Illustrations. Price 4s.*

Germany—Rhine. **Kerp.**

Am Rhein. Die Rheinlande von Frankfurt bis Düsseldorf und die Thäler des Rheinischen Schiefergebirges. Von H. Kerp. (Land und Leute. Monographien zur Erdkunde, x.) Bielefeld and Liepzig: Velhagen & Klasing, 1901. Size 10½ × 7, pp. 184. *Map and Illustrations. Price 4s.*

Greece—Ithaca. **Salvator.**

Sommertage auf Ithaka. [By the Archduke Ludwig Salvator.] Prague: H. Mercy Sohn, 1903. Size 15 × 11½. *Plates. Presented by the Archduke Ludwig Salvator.*

This sumptuous volume consists of a series of heliogravures from the author's own sketches.

Holland. *Angewandte G.* **1 S**, 6 Heft (1903): pp. 122. **Menne.**

Die Entwickelung der Niederländer zur Nation. Eine anthropogeographische Skizze. Von Dr. Karl Menne. *With Illustrations.*

An attempt to bring out the geographical basis of the history of Holland.

Hungary. *Meteorolog. Z.* **20** (1903); 255–264. **Hegyfoky.**

Die Schwankung der Aufblühezeit und die Temperatur in Ungarn. Von J. Hegyfoky.

Hungary. **Popescu.**

Beiträge zur Entstehungsgeschichte des oberen Oltthales. Inaugural-Dissertation von S. D. Popescu. Leipzig, 1902. Size 9 × 6, pp. 94. *Presented by the Author.*

Iberian Peninsula—Mosquitoes. **Pittaluga.**

Atti R.A. Lincei, Rendiconti **12** (1) (1903): 529–538.

Sulla presenza e distribuzione del genere *Anopheles* in alcune regioni della penisola Iberica, e suoi rapporti col parasita della malaria umana. Nota del dott G. Pittaluga.

Iceland. *G. Tidskrift* **17** (1903–1904): 93–109. **Thoroddsen.**

Geografiske og geologiske Undersøgelser ved den sydlige Del af Faxaflói paa Island. Af Prof. Dr. T. Thoroddsen.

Italy. *Traductions et Reproductions S. Belge Géologie* **17** (1903): 69–75. **Alippi.**

Les Boniti du Monte Nerone. Par Tito Alippi.

"Boniti" are detonations of the nature of those known elsewhere as "mistpoeffers."

Italy—Abruzzi. *La G., B.S.G. Paris* **8** (1903): 1–12. **Squinabol**

Une excursion à Capracotta en Molise. Observations de géographie physique sur un territoire mal affermi. Par S. Squinabol. *With Illustrations.*

Italy—Carrara. *Tour du Monde* **9** (1903): 325–336. **Brontelles.**

Carrare: la cité du Marbre. Par M. Reymond de Brontelles. *With Illustrations.*

Italy—Gravity. *Atti R.A. Lincei, Rendiconti* **12** (1) (1903): 483–490. **Riccò.**

Riassunto delle determinazioni di gravità relativa fatte nella Sicilia Orientale, in Calabria e nelle isole Eolie. Nota del A. Riccò. *With Map.*

Italy—Lombardy. *B S.G. Italiana* **4** (1903): 345–349. **Bertolini.**

Sulla permanenza del significato estensivo del nome di Lombardia. Nota del Prof. G. Lod. Bertolini.

Italy—Riviera. **Hörstel.**

Die Riviera: von W. Hörstel. (Land und Leute. Monographien zur Erdkunde, xi.) Bielefeld and Leipzig: Velhagen & Klasing, 1902. Size 10½ × 7, pp. 132. *Map and Illustrations. Price* 4*s.*

Italy—Rome. **Kaemmel.**

Rom und die Campagna. Von Otto Kaemmel. (Land und Leute. Monographien zur Erdkunde, xii.) Bielefeld and Leipzig: Velhagen & Klasing, 1902. Size 10½ × 7, pp. 188. *Map and Illustrations. Price* 4*s.*

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On the Recent Geological History of the Bergen District of Norway. By H. W. Monckton. [Reprinted from the *Proceedings of the Geologists' Association*, vol. xviii. part ii., 1903.] Size 8½ × 5½, pp. 53–70. *Presented by the Author.*

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Le régime du Dniepr. Par R. de Wybranowski.

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Beiträge zur physischen Geographie des Finnischen Meerbusens. Inaugural Dissertation . . . Von E. F. Piccard. Kiel: K. Jansen, 1903. Size 9½ × 6½, pp. xii. and 124.

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On the history of the Cartography of Sweden down to 1850.

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A Pleasure-Book of Grindelwald. By Daniel P. Rhodes. New York and London: Macmillan & Co., 1903. Size 8½ × 5½, pp. xvi. and 236. *Map and Illustrations. Price 6s. net. Presented by the Publishers.*

Descriptive sketches of the neighbourhood of Grindelwald and its people, intended for holiday travellers.

Switzerland. *B.S.G. Lyon* **18** (1903): 135–156. **Goegg.**

Le Percement du Simplon et la question des voies d'accès françaises. Par G. Goegg. *With Map and Illustrations.*

Switzerland—Cartography. **Becker.**

Jahrb. Schweiz. Alpenclub **38** (1902–1903): 327–340.

Fortschritte in der Kartographie, Begleitwort zu der Karte der Kurfirsten-Säntis-gruppe. Von Prof. F. Becker.

United Kingdom. *Quarterly J. Geolog. S.* **59** (1903): 337–347. **Arnold-Bemrose.**

Geology of the Ashbourne and Buxton Branch of the London & North-Western Railway—Crake Low to Parsley Hay. By H. H. Arnold Bemrose. *With Illustrations.*

United Kingdom—Cheviot Hills. **Kendall and Muff.**

T. Edinburgh Geolog. S. **8** (1903): 226–230.

On the Evidence for Glacier-dammed Lakes in the Cheviot Hills. By P. F. Kendall and H. B. Muff.

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The Future of British Fisheries Investigation. By Professor W. A. Herdman. (Extracted from Prof. Herdman's 'Report on the Lancashire Sea Fisheries Scientific Investigations for 1902.' Trans. Biological Society of Liverpool, vol. xvii., 1903.) Liverpool: C. Tinling & Co., 1903. Size 8½ × 5½, pp. 39–54. *Sketch-Map. Presented by the Author.*

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The Improvement of British Forestry. By J. Nisbet.

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The Prevalence of Gales on the Coasts of the British Islands during the thirty years 1871–1900. (Second Paper.) By F. J. Brodie. *With Diagrams.*

United Kingdom—Geology. **Jukes-Browne and Hill.**

Memoirs of the Geological Survey of the United Kingdom. The Cretaceous Rocks of Britain. Vol. ii. The Lower and Middle Chalk of England. By A. J. Jukes-Browne, with contributions by William Hill. London, 1903. Size 10 × 6, pp. xiv. and 568. *Map, Plates, and Illustrations. Price 10s. Presented by the Geological Survey.*

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The Itinerary of Patrick in Connaught, according to Tírechán. By Dr. J. B. Bury.

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Some Illustrations of the Commercial History of Dublin in the Eighteenth Century. By C. Litton Falkiner. *With Plates.*

United Kingdom—London. *J.R.I. Brit. Architects* **10** (1903): 461–468. **Fleming.**

The Architectural Development of London. By O. Fleming.

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Bognor Climatological Society. Annual Report and Results of the Observations made during the year 1902, at the Bognor Climatological Station, Lat. 50° 47′ N., long. 0° 40′ 30″ W. Height above mean sea-level, 20 feet. Bognor. Size 9 × 5½, pp. 14.

United Kingdom—Norfolk. *Quarry* **8** (1903): 336–341. ——

The Mineral Industry of the United Kingdom. XIII. Norfolk. *With Map and Sections.*

United Kingdom—Place-names. *Halifax Naturalist* **8** (1903): 35–37. ——

Some Place-names and their Meanings.

Vistula. *Ann. G.* **12** (1903): 214–234. **Auerbach.**
Le régime de la Vistule. Par B. Auerbach.

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Annam. *B. l'École Française d'Extrême-Orient* **3** (1903): 164–205. **Cadière.**
Les lieux historiques du Quang-bình. Par le R. P. Cadière. *With Maps.*

Asia. *Quarterly Rev.* **198** (1903): 155–177. **Colquhoun.**
Asia in Transformation. By A. R. Colquhoun. *With Map.*

Central Asia—Tian Shan. *Petermanns M.* **49** (1903): 134–137. **Friederichsen.**
Beiträge zur Morphologie des zentralen Tiën-schan. Von Dr. Max Friederichsen. (Auszug eines auf dem XIV. Deutschen Geographentage in Cöln gehaltenen Vortrags.)

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The Botany of the Ceylon Patanas.—II. By J. Parkin and H. H. W. Pearson. *With Plates.*

The former paper appeared in the same journal in 1899 (vol. xxxiv. pp. 300–305, *with map*). The present paper discusses the influence of external conditions on the biological characters of the plants of the patanas (grass-lands).

China—Cartography. **Chavannes.**
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Les deux plus anciens spécimens de la cartographie chinoise. Par E. Chavannes. *With Maps.*

These two maps were engraved in 1137 A.D. The originals are now in the museum at Singan-fu.

China—Chekiang. *J. China Br. R. Asiatic S.* **33** (1899–1900): 261–283. **Walshe.**
The Ancient City of Shaohing (Province of Chek-kiang). By the Rev. W. G. Walshe.

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Irrigation of the Ch'eng Tu Plain. By J. Vale.

China—Wei-Hai-Wei. **Lockhart.**
Wei-Hai-Wei. Report for 1902. Colonial Reports. Annual No. 388, 1903. Size 10 × 6½, pp. 58. *Price* 3*d.*
Contains notes on meteorology.

China—Yang-tse. *La G., B.S.G. Paris* **8** (1903): 65–74. **d'Anty.**
La navigation à vapeur dans le bassin supérieur du Yang-tseu. Par P. Bons d'Anty.

Eastern Asia. *Contemporary Rev.* **84** (1903): 189–208. **Ular.**
Russia, Manchuria, and Mongolia. By A. Ular.

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F. v. Richthofens Geomorphologische Studien aus Ostasien. III. Die morphologische Stellung von Formosa und den Riu-kiu-Inseln. Von Prof. Dr. K. Futterer.

French Indo-China—Saigon. *Rev. Maritime* **157** (1903): 1377–1402. **Castex.**
Le nouveau port de Saïgon. Par R. Castex. *With Maps and Plan.*

India—Himalayas. *Jahrb. Schweiz. Alpenclub* **38** (1902–1903): 212–227. **Guillarmod.**
Un record dans l'Himalaya. Par le Dr. J. Jacot Guillarmod. *With plates.*
Account of the Anglo-Austrian Expedition of 1902.

India—Historical. **Jackson.**
Historical Records of the XIII. Madras Infantry. Compiled by Lieutenant R. P. Jackson. London, Calcutta, and Simla: Thacker & Co., 1898. Size 10 × 6½, pp. 320. *Plates. Presented by the 13th Madras Infantry.*

India—Historical. *Blackwood's Mag.* **174** (1903): 220–236. **Forrest**
The Tragedy of the Black Hole. By G. W. Forrest.
The writer endeavours to give an accurate version of the events connected with the Black Hole tragedy, which have been the subject of considerable misapprehension.

India—History. **Davids.**
Buddhist India. (Story of the Nations.) By T. W. Rhys Davids. London: T.

Fisher Unwin, 1903. Size 8 × 5, pp. xvi. and 332. *Map and Illustrations. Price 5s. Presented by the Publisher.*

India—Trigonometrical Survey. ——

Account of the Operations of the great Trigonometrical Survey of India. Vol. xvii. Electro-Telegraphic Longitude Operations executed during the years 1894–95–96. The Indo-European Arcs from Karachi to Greenwich. Dehra Dun, 1901. Size 12½ × 9½, pp. xviii, 320, and 12. *Map, Portrait, and Plates. Price Rs.*10 8 *annas. Presented by the Survey of India Department.*

India—Water-supply. *Imp. and Asiatic Quarterly Rev.* **16** (1903): 30–42. **Ward.**

Suggestions for increasing the Water-supply in Central India, and for the prevention of Floods. By G. E. Ward.

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On the tribute-bearing mission from Ladak to Lhasa.

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Le Fou-nan. Par P. Pelliot.

Fu-nan was a Hinduized state often spoken of in Chinese documents from the third to the seventh century, the identification of which has been a matter of some difficulty.

Japan—Formosa. **Campbell.**

Formosa under the Dutch, described from Contemporary Records, with Explanatory Notes and a Bibliography of the Island. By Rev. Wm. Campbell. London: Kegan Paul, Trench, Trubner & Co., 1903. Size 8½ × 6½, pp. xiv. and 630. Frontispiece. *Price* 12*s. net. Presented by the Publishers.*

Japan and Manchuria. *Questions Dipl. et Colon.* **16** (1903): 198–220. **Labbé.**

Au Japon et en Mandchourie, Souvenirs de l'an dernier. Par P. Labbé. *With Map.*

Malay Archipelago—Krakatau. *Naturw. Wochenschrift* **2** (1903): 495–498. **Seckt.**

Die Fortschritte der Flora des Krakatau. Von Dr. H. Seckt. *With Illustrations.*

Cf. note in the *Journal* for July (*ante*, p. 82).

Persia and Turkey. *B. American G.S.* **35** (1903): 1–7. **Shedd.**

The Syrians of Persia and Eastern Turkey. By W. A. Shedd.

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Neue Pläne für den Bau von Eisenbahnen in Russisch-Asien. Von Generalmajor z. D. Krahmer.

Russian Central Asia. *Asien* **2** (1903): 133–137. **Hartmann.**

Die Verwaltung der russischen Provinz Turkestan. Von Prof. Dr. M. Hartmann.

Siam. *B.S.G. Marseille* **27** (1903): 20–34. **Deloncle.**

La question du Siam. Conférence de F. Deloncle.

Tongking. *B.S.G. Rochefort* **25** (1903): 57–61. **[d'Auriac].**

La baie d' Ha-long.

Turkey—Asia Minor. *P.S. Biblical Archæology* **25** (1903): 225–233, 250–258. **Pilcher.**

The Jews of the Dispersion in Roman Galatia. By E. J. Pilcher. *With Plate.*

Turkey—Syria. **Dussaud.**

Notes de Mythologie Syrienne. Par René Dussaud. Paris: E. Leroux, 1903. Size 10 × 6½, pp. 68. *Illustrations.*

Turkey—Syria. **Dussaud and Macler.**

Mission dans les régions désertiques de la Syrie moyenne. Par R. Dussaud avec la collaboration de F. Macler. (Extrait des *Nouvelles Archives des Missions Scientifiques*, t. x.) Paris: E. Leroux, 1903. Size 10 × 6½, pp. 342. *Map and Illustrations.*

On a journey for archæological research.

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Africa. *J. African S.* **2** (1903): 349–358. **Johnston.**
Presidential Address. The Work of the African Society. By Sir H. H. Johnston, G.C.M.G.

Africa—Orthography. *J. African S.* **2** (1903): 456–459. ——
The orthography of African Names and Languages. By the Editor.
The Society's system has been adopted with a few modifications.

Algeria. *Ann. Club Alpin Français* **29** (1902): 303–326. **Reynier.**
L'alpinisme en Algérie, ascensions dans la chaîne du Djurjura. Par A. Reynier. *With Map and Illustrations.*

British Central Africa. *J. African S.* **2** (1903): 380–399. ——
Extracts from Letters by F. H. M., an Official in the N.E. Rhodesian Service of the British South African Company. *With Illustrations.*

British Protectorates. ——
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Central Africa. *Mouvement G.* **20** (1903): 370–375. **Chevalier.**
L'exploration du Dar Banda. Par A. Chevalier. *With Maps.*

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Exploration des affluents de l'Ubangi, les rivières Ibenga et Botapo. Par M. Coupé. *With Map.*

Congo State—Katanga. *Mouvement G.* **20** (1903): 250–254, 278–280. **Grey and Farrell.**
Au Katanga.

East Africa. *Z. Ges. Erdk. Berlin* (1903): 254–279, 398–421. **Engler.**
Ueber die Vegetationsformationen Ost-Afrikas auf Grund einer Reise durch Usambara zum Kilimandscharo. Von Prof. Dr. A. Engler.

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Notes on an Expedition to the Fayûm, Egypt, with Descriptions of some New Mammals. By Dr. C. W. Andrews. *With Illustrations.*

French Congo. *La G., B.S.G. Paris* **8** (1903): 89–95. **Chevalier.**
Exploration scientifique dans les états de Snoussi, Sultan du Dar el-Kouti. Par A. Chevalier. *With Map.*
See note in the Monthly Record (*ante*, p. 569).

French Congo. *Z. Ges. Erdk. Berlin* (1903): 434–438. **Chevalier.**
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De l'Oubangui à N'Dellé par la Kotto. Par — Superville. *With Map.*

Gold Coast. *J. African S.* **2** (1903): 444–450. **Perregaux.**
A few Notes on Kwahu ("Quahoe," a Territory in the Gold Coast Colony, West Africa). By Rev. W. Perregaux.

Madagascar. *Ann. Club Alpin Français* **29** (1902): 327–343. **Jarnac.**
Une excursion en Émyrne en 1902. Par A. De Jarnac. *With Illustrations.*

Madagascar. *C. Rd.* **136** (1903): 1298–1301. **Colin.**
Travaux astronomiques et magnétiques à Madagascar. Note du P. Colin.

Morocco. *B.S.G. Marseille* **27** (1903): 7–19. **Segonzac.**
Le Maroc. Conférence du Marquis de Segonzac. *With Map.*

Morocco. *Petermanns M.* **49** (1903): 155–159. **Fischer.**
Zur Entwicklung unserer Kenntnis des Atlas-Vorlandes von Marokko. Von Prof. Th. Fischer.

Portuguese West Africa. *B.S.G. Lisboa* **21** (1903): 81–94. **Castro.**
De Noqui ao Cuango, notas de viagem. Por J. Moraes e Castro.

Sahara. *B.S.G. Marseille* **27** (1903): 90–97. **Tournier.**
Les oasis du Touat. Par le Capitaine Tournier.

Sahara—Figig. *B. Comité l'Afrique Française* **13** (1903): 179–184. **Terrier.**

Les événements de Figuig. Par A. Terrier. *With Map.*

Sierra Leone. **Wallis.**

The Advance of our West African Empire. By C. Braithwaite Wallis. London: T. Fisher Unwin, 1903. Size 9½ × 6, pp. xvi. and 318. *Map and Illustrations. Price* 21*s. Presented by the Publishers.*

The title is somewhat misleading, for although there are one or two chapters on general principles of administration and trade in West Africa, the bulk of the book relates to events in Sierra Leone in 1898, on which it gives valuable information.

South Africa—Orange River. **Parkinson.**

T. South African Philosoph. S. **14** (1903): 76–78.

Irrigation on the Orange River. By F. B. Parkinson.

Togo. *Globus* **83** (1903): 309–314, 341–345. **Klose.**

Das Bassarivolk. Von H. Klose. *With Illustrations.*

Uganda. ——

Uganda Protectorate Intelligence Report No. 14, with Appendices.—(A). Report on the Nile District, by Captain J. A. Meldon. (B). Report on the Bari tribe, by the same. 1902. Size 13½ × 8½, pp. 10. *Presented by the Foreign Office.*

West Africa. *Rev. Colon.* (1903): 576–599. **Duboc.**

Commission française de délimitation du golfe de Guinée. Rapport géographique et ethnographique. Par le lieutenant Duboc. *With Maps.*

Deals with the country on the northern frontier of French Congo.

West Africa—Volta River. **Worsnop**

River Volta from Kpong to Kratchie. By T. H. Worsnop. [Typewritten sheets.] Size 13 × 8, pp. 43. *Presented by the Author.*

NORTH AMERICA.

Canada. *T. Hist. and Sci. S. Manitoba*, No. **63** (1903): pp. 16. **Bryce.**

Letters of a Pioneer: Alexander Ross. Edited by George Bryce, LL.D.

Extracts from letters recently brought to light.

Canada. *Nineteenth Century* **54** (1903): 314–324. **Machray.**

'The Granary of the Empire.' By Robert Machray.

Canada—Bibliography. **Wrong and Langton.**

Review of Historical Publications relating to Canada. Edited by G. M. Wrong and H. H. Langton. Volume vii. Publications of the year 1902. The University of Toronto, 1903. Size 11 × 7, pp. xii. and 222.

Canada—Railway. *Scottish G. Mag.* **19** (1903): 422–425. **Begg**

Grand Trunk Pacific Railway Extension. By A. Begg.

Canada—Rocky Mountains. **Bonney.**

The Canadian Rockies. Part ii. On some Rock-specimens collected by E. Whymper, Esq., in the Canadian Rocky Mountains. By Prof. T. G. Bonney, D.Sc. [Extracted from the *Geological Magazine*, Decade iv. vol. ix. No. 462, pp. 544–550, December, 1902.] Size 8½ × 5½.

Canada—Rocky Mountains. **Stutfield and Collie.**

Climbs and Exploration in the Canadian Rockies. By Hugh E. M. Stutfield and J. Norman Collie. London, etc.: Longmans, Green & Co., 1903. Size 9 × 5½, pp. xii. and 344. *Map and Illustrations. Price* 12*s.* 6*d. net. Presented by the Publishers.*

Describes the several journeys of exploration by the authors from 1897 onwards.

Canada and Alaska. ——

Boundary between the Dominion of Canada and the Territory of Alaska. Case presented on the part of the Government of His Britannic Majesty to the Tribunal constituted under Article 1 of the Convention signed at Washington, January 24, 1903, between His Britannic Majesty and the United States of America. (London, 1903, pp. 106.)

Appendix to ditto. Vol. i. (London, 1903. pp. xi. and 314.)

Counter-case presented on the part of the Government of His Britannic Majesty, etc., etc. (London, 1903, pp. 82.)

Appendix to ditto. Vol. I. (London, 1903, pp. iv. and 100.)

Also Atlas and Portfolio of Maps. Size 13½ × 8½.

Mexico—Boundary. **Blanco.**

Memoria de la Sección Mexicana de la Comisión Internacional de Límites entre México y los Estados Unidos que Restableció los Monumentos de el Paso al Pacífico. Bajo la dirección por parte de México del Ingeniero Jacobo Blanco. Nueva York, 1901. Size 12 × 9, pp. 366. *Illustrations.*

Mexico—Vera Cruz. *B. American G.S.* **35** (1903): 291–294. ——

The New Port of Vera Cruz. *With Plan.*

North America—Geology. **Weeks.**

B. United States Geolog. Surv., No. 191 (1902): pp. 448.

North American Geologic Formation, Names, Bibliography, Synonymy, and Distribution. By F. B. Weeks.

United States. *Petermanns M., Ergänzungsheft, Nr.* 142 (1903): pp. 106. **Blum.**

Die Entwicklung der Vereinigten Staaten von Nordamerika. Bearbeitet und zusammengestellt von Richard Blum. *With Maps.*

Deals with the development of population and economic resources.

United States. **Hulbert.**

Historic Highways of America. Vol. vi. Boone's Wilderness Road. Vol. vii. Portage Paths. The Keys of the Continent. By Archer Butler Hulbert. Cleveland, Ohio: The Arthur H. Clark Co., 1903. Size 8 × 5½, pp. (vol. vi.) 208; (vol. vii.) 194. *Maps and Illustrations.*

United States. **Johnson.**

The High Plains and their Utilization. By Willard D. Johnson. (Annual Reports, Department of Interior, 1900, Part iv., pp. 601–741; 1901, Part iv., pp. 631–669. Washington, 1901–1902.) *Maps and Illustrations.*

United States. ——

Annual Reports of the Departments of the Interior for the fiscal year ended June 30, 1901. Twenty-Second Annual Report of the United States Geological Survey. Part i. Report of the Directors; Part ii. Ore Deposits; Part iii. Coal, Oil, Cement; Part iv. Hydrography. 4 vols. Washington, 1901. Size 11½ × 7½, pp. (vol. i.) 464; (vol. ii.) 888; (vol. iii.) 764; (vol. iv.) 690. *Maps, Plates, etc. Presented by the U.S. Department of the Interior.*

United States—California. **Campbell.**

B. United States Geolog. Surv., No. 200 (1902): pp. 24.

Reconnaissance of the Borax Deposits of Death Valley and Mohave Desert. By M. R. Campbell. *With Map.*

United States—Forests. *La G., B.S.G. Paris* **8** (1903): 23–28. **Hardy.**

Les réserves forestières des Etats-Unis. Par Marcel Hardy.

United States—Green Mountain Region. **Dale.**

B. United States Geolog. Surv., No. 195 (1902): pp. 22.

Structural Details in the Green Mountain Region and in Eastern New York. (Second Paper.) By T. N. Dale. *With Illustrations.*

CENTRAL AND SOUTH AMERICA.

Bolivia. ——

Sinopsis Estadistica y Geográfica de la República de Bolivia. Tomo i. La Paz, 1903. Size 9 × 6, pp. iv. and 394.

Brazil. *Petermanns M.* **49** (1903): 145–149. **Jerrmann.**

Diamantino, an der Grenze der Zivilisation. Von Kapitän Ludwig Jerrmann. *With Map.*

Central America. **Davis.**

Hydrography of the American Isthmus. By Arthur Powell Davis. (Annual Reports, Department of Interior, 1901, Part iv., pp. 507–630.) *Maps and Illustrations.*

Central America. *Globus* **84** (1903): 72–74. **Krebs.**

Flutschwankungen und die vulkanischen Ereignisse in Mittelamerika. Ein Beitrag zur Frage der Beziehungen des Meeres zum Vulkanismus. Von W. Krebs.

Central America—Canal. **Marcel.**

Gabriel Marcel: Un éventail géographique. (Extrait de la *Revue hispanique*, tome ix.) Paris, 1902. Size 10 × 6¼, pp. 20. *Map. Presented by the Author.*

On a map printed in the eighteenth century for insertion on a fan, illustrating a scheme for an American interoceanic canal.

Costa Rica. **Pittier de Fábrega.**

Folk-Lore of the Bribri and Brunka Indians in Costa Rica. By H. Pittier de Fábrega. (*The Journal of American Folk-Lore*, vol. xvi. January—March, 1903. No. lx.) Size 9½ × 6½, pp. 9. *Presented by the Author.*

Guatemala. *B. American G.S.* **35** (1903): 231–252. **Eisen.**

Notes during a Journey in Guatemala, March to December, 1902. By G. Eisen, PH.D.

Jamaica. **Pullen-Burry.**

Jamaica as it is, 1903. By B. Pullen-Burry. London: T. Fisher Unwin, 1903. Size 7½ × 5, pp. xvi. and 240. *Map and Illustrations. Price 6s. net. Presented by the Publisher.*

A useful little book for those who contemplate a visit to Jamaica, the advantages of which as a charming winter-resort are dwelt upon by the writer.

Martinique. *Z. Ges. Erdk. Berlin* (1903): 431–433. **Wegener.**

Einige neue Aufnahmen vom Mont Pelé. Von Dr. G. Wegener. *With Plates.*

Peru. ——

Perú. A sketch for capitalists, tradesmen, and settlers. A report on the industries that can be developed and on those that might be introduced. Lima, 1903. Size 7½ × 5½, pp. 58. *Maps and Illustrations. Presented by the Peruvian Government.*

Peru and Bolivia. **Saavedra.**

Bautista Saavedra. El Litigio Perú-boliviano. La Paz, 1903. Size 9 × 5½, pp. 160. *Map. Presented by the Sociedad Geografica de La Paz.*

Porto Rico. **Churchward.**

Trade of Porto Rico for the year 1902. Foreign Office, Annual No. 3027, 1903. Size 10 × 6½, pp. 22. *Price* 1½*d.*

St. Vincent. *Ann. G.* **12** (1903): 261–268. **Lacroix.**

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A reprint of papers written at various times, with a view to elucidate the origin of calendars marked by zodiacal constellations. In the first paper the author suggests that the Accadian calendar originated at a time when the *winter solstice* coincided with the sun's entry into Aries, viz. about 6000 B.C.

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Another attempt is here made to represent relief by shading as it would appear upon raised models of the countries when light is allowed to fall in one direction, and upon the whole the effect is not unsatisfactory. Still, this system has its weak points, the chief of which is that the great difference in the intensity of the shading of the slopes of mountain ranges, depending as it does solely upon their direction with reference to that from which the light is supposed to fall, often gives an erroneous impression as to the relative steepness of the slopes of the ranges. The defect is very apparent in many instances in these maps, as, for instance, in that of the British Isles, where the steeper slope of the South Downs is thrown upon the south side instead of the north, as is actually the case. In some cases, as in the map of Switzerland, the leading characteristic features of the relief of the country are not satisfactorily brought out, owing in great measure to there not being sufficient difference in the intensity of the shading, many comparatively low slopes being as darkly shaded as those of far greater altitude. The maps, or diagrams, as they might be more correctly described, are, however, very clear, and decidedly graphic in their general appearance. They are without names, but the positions of the principal cities and towns are shown in red. On the map of the British Isles there is an inset, showing the location of coal and iron, and on that of France one showing coal and vines. Although the maps are of different scales, the area of the country in proportion to that of England is stated under the title of each map. Any of the maps in this series can be purchased separately for three shillings.

Germany. **Königl. Preuss. Landes-Aufnahme.**

Karte des Deutschen Reiches. Scale 1 : 100,000 or 1·6 stat. miles to an inch. Sheets: 257, Haselünne; 288, Braunschweig; 312, Wolfenbüttel; 382, Brilon. Herausgegeben von der Kartogr. Abtheilung der Kgl. Preuss. Landes-Aufnahme, 1902-3. *Price* 1.50 *marks each sheet.*

Germany. **Krümmel.**

Verbreitung der Wind- und Wasser-Motoren im Deutschen Reich. Scale 1 : 5,000,000 or 78·9 stat. miles to an inch. Nach der Gewerbezählung vom 14 Juni. 1895, dargestellt von O. Krümmel. *Petermanns Geographische Mitteilungen*, Jahrgang 1903, Taf. 15. Gotha: Justus Perthes. *Presented by the Publisher.*

Glasgow. **McDonald.**

Map of the County of the City of Glasgow and the Vicinity. Compiled from actual survey. A. B. McDonald, M.I.C.E., City Engineer. Scale 440 feet to an inch. Edinburgh: John Bartholomew & Co., 1902. *Presented by A. B. McDonald, Esq., M.I.C.E.*

This is a new edition, revised and corrected.

Spain. **Direccion General del Instituto Geográfico y Estadistico.**

Mapa Topografica de España. Scale 1 : 50,000 or 0·78 stat. miles to an inch. Sheets: 841, Alcaraz; 580, Méntrida; 864, Montizón; 865, Siles; 866, Yeste; 885, Santisteban del Puerto; 886, Beas de Segura; 887, Orcera; 900, La Cardenchosa; 901, Villaviciosa; 902, Adamuz; 903, Montboro; 904, Andújar; 905, Linares; 906, Úbeda; 907, Villacarrillo; 921, Las Navas de la Concepción; 922, Santa Maria de Tras-Sierra; 923, Córdoba; 924, Bujalance; 927, Baeza; 944, Espejo. Direccion General del Instituto Geográfico y Estadistico, Madrid.

Turkey. **Turkish General Staff.**

Map of European Turkey. Scale 1 : 216,000 or 3·4 stat. miles to an inch. Turkish General Staff, Constantinople, 1903. 25 sheets and index. [In Turkish character.]

ASIA.

Asia. **Service Géographique de l'Armée, Paris.**

Asie. Scale 1 : 1,000,000 or 15·8 stat. miles to an inch. Sheets: Canton and Hué. Paris: Sérvice Géographique de l'Armée. *Price* 1.25 *fr. each sheet.*

Indian Government Surveys. **Surveyor-General of India.**

Indian Atlas, 4 miles to an inch. Sheets: 14, district Peshâwar and parts of districts Kohat and Huzára, with Buner, Swat and Tirah (N.W. Frontier Province), Ráwalpindi (Punjab) and Kabul (Afghanistan), additions to 1901. 22 S.E., parts of districts Ahmedabad, Broach, Kaira, and Panch Mahâls of Jhálávad (Kathiawar) and the Native States of Baroda, Cambay, Mahi Kántha and Rewa Kántha (Bombay Presidency), additions to 1901. 28, parts of districts N.W. Frontier Province, Ráwalpindi (Punjab) and of Native State, Kashmir, additions to 1901. 29, parts of districts Gujrat, Jhelum, Ráwalpindi, Shahpur, Gujranwala, Gurdáspur, Kangra, and Sialkot (Punjab), and Kishtwar, Nowshera, Badrawar, and Jummoo (Kashmir), additions to 1901. 32 N.E., parts of districts Hissar and Loháru, Native State (Punjab) and State of Bikaner (Rájputána), additions to 1898, 1901. 32 S.W., part of Bikaner (Rájputána Agency), additions to 1901, 1902. 33 N.W., parts of Bikaner and Jodhpur, Native States (Rájputána Agency), additions to 1901, 1902. 33 N.E., parts of Jaipur, Jodhpur and Bikaner (Rájputána), Shaikhawati, and Torawati, subordinate to Jaipur, additions to 1899, 1902. 48 S.E., parts of districts Dehra Dun, British Garhwál, Saháranpur, Muzaffarnagar and Bijnor (United Provinces of Agra and Oudh), Karnál and Umballa (Punjab), additions to 1901. 49 N.W., parts of districts Rohtak, Hissar, Karnál and Delhi, and of Native States Jind, Dujána, and Loháru (Punjab), additions to 1899. 60 N.E., parts of districts Bangalore, Kolar, and Tumkur (Mysore), additions to 1900. 61 N.W., part of district Mysore (Mysore), additions to 1902. 68, districts Etah, Farukhabad, Mainpuri, Etawah, Cawnpore and Budaon, Sitapur, Hardoi, Unao and Kheri (United Provinces of Agra and Oudh), and part of Gwalior and Dholpur (Native States), additions to 1900, 1902. 76, parts of districts Kurnul, Guntur, Nellore, and Cuddapah (Madras Presidency), additions to 1899, 1902. 79, parts of districts Tanjore, Trichinopoli, Salem, Coimbatore, Madura and South Arcot (Madras Presidency), Pondicherri, and Karikal (French Territory), additions to 1900, 1902. 87 S.E., parts of districts Azamgarh, Gorakhpur, Basti, Fyzabad, Sultanpur, and Gonda (United Provinces of Agra and Oudh), additions to 1901. 90 N.W., parts of districts Mandla and Bilâspur (Central Provinces), Native States of Rewah (C.I. Agency), and Chang Bhakar of Garhjât States (Bengal), additions to 1898, 1902.

91 S.W., parts of districts Raipur, Balaghat, Bhandára and Chanda, and Native States of Khairagarh and Nandgaon (Central Provinces), additions to 1901, 1902. 102, parts of districts Gorakhpur and Basti (N.W. Provinces), Saran Champaran and Muzaffarpur (Bengal), and Nepal, additions to 1899. 113, parts of districts Birbhum, Burdwan, Bhagalpur, Monghyr, Gaya, Manbhum, Murshidabad, Bankura, Southal Parganas, Hazaribagh, and Lohardaga (Bengal), additions to 1900, 1901. 125 N.E., parts of districts Khasi and Jaintia Hills, Sylhet, Naga Hills, and Cachar (Assam), additions to 1901. 126 N.E., parts of districts Sylhet, Cachar and North Lushai Hills (Assam), and Chittagong, and the Native State of Hill Tippera (Bengal), additions to 1900.—India, 128 miles to an inch, 1 sheet, with additions to 1901.—Assam Survey, 1 mile to an inch. Sheets: (Preliminary Edition) 40, districts Kámrup and Darrang, Seasons 1884–86 and 1892–98, 1902; (Second Edition) 54 and 55, part of district Khasi and Jaintia Hills, Season 1867–68, 1902; 164, district Lushai Hills, Seasons 1899–1901, 1902.—Bengal, district Hughly, additions to 1900, 1902.—Bengal Survey, 1 mile to an inch. Sheets: (Preliminary Edition) 55, district Saran, Seasons 1893–94 and 1895–99, 1902; 78, 79, and 89, district Champáran, Seasons 1883–84, 1892–96, and 1900–01, 1902; 81, districts Champáran and Sáran, Seasons 1892–96, 1902; 82, districts Muzaffarpur Champáran and Sáran, Seasons 1893–98, 1902; 83 and 112, districts Muzaffarpur and Sáran, Seasons 1892–99, 1902; 110, districts Muzaffarpur and Champáran, Seasons 1893–96, 1902; 163, district Cuttack, Season 1894–95, 1902; (Second Edition) 258, districts Sonthál Parganas Murshidabad, and Birbhum, Seasons 1841–43 and 1850–54, 1903; 281, districts Murshidabad and Birbhum, Seasons 1853–54, 1902.—Lower Provinces, Bengal, district Bhágalpur, 4 miles to an inch (Second Edition), with additions and corrections to 1902; district Burdwan, 4 miles to an inch, with additions and corrections to 1901, 1902.—Bombay Survey, 1 mile to an inch. Sheets: 45, part of Káthiáwár Agency, Season 1874–75, 1901; 193, parts of districts Násik and Thána, Seasons 1871–75, 1902; 194, districts Thána, Ahmednagar, and Násik, Seasons 1875–77 and 1879–80, 1902; 199, districts Poona and Kolába and Bhor State, Season 1873–74, 1902.—Burma Survey, 1 mile to an inch. Sheets: (Preliminary Edition) 62 and 96 (New Series), district Upper Chindwin, Season 1894–97, 1902–03; (Second Edition) 109, districts Minbu, Myingyan and Pakôkku, Seasons 1891–92, 1895–96, and 1897–98, 1902; (Preliminary Edition) 186 and 187 (New Series), district Katha, Season 1895–98, 1902; 236 (New Series), parts of districts Shwebo, Ruby Mines, Katha, and Northern Shan States, Season 1900–01, 1902; 239 (New Series), parts of districts Shwebo, Ruby Mines, Mandalay, and Hsi Paw (Northern Shan States), Season 1899–1900, 1902; (Preliminary Edition) 290 (New Series), parts of districts Mandalay and Kyaukse and of Southern Shan States, Season 1899–1900, 1901; (Preliminary Edition) 297 (New Series), parts of district Yamethin, the Myelat, and Southern Shan States, Season 1896–97, 1901; (Preliminary Edition) 335 and 336 (New Series), Southern Shan States, Season 1899–1900, 1901; 432 (New Series), parts of Northern Shan States, Season 1900–01, 1902; (Preliminary Edition) 469, 529 and 530 (New Series), district Tavoy, Seasons 1891–93, 1902; 506 (New Series), parts of Northern and Southern Shan States, Season 1900–01, 1902.—China Field Force Survey, 2 miles to an inch. Sheets: 10, 11 and 14, China, Chih-Li Province, Season 1900–01, 1902.—Madras Survey, 1 mile to an inch. Sheets: 53, part of district Mysore (Mysore), Season 1884–85, 1902; 78, part of district Mysore, Seasons 1876–78, 1901; 110, parts of district Mysore (Mysore) and Coimbatore (Madras), Season 1884–85, 1902; 138, parts of districts Bangalore and Kolar (Mysore), Seasons 1876–78, 1902; 139, parts of districts Bangalore and Kolar (Mysore), and Salem (Madras), Seasons 1877–80, 1902; 202, part of district Kolar (Mysore), Seasons 1885–86, 1902.—North-Eastern Frontier, 4 miles to an inch. Sheets: 22 N.E., China, Yünnan Province, Season 1899–1900, 1903; (Third Edition) 22 S.W., parts of Singpho Naga Hills and the Upper Irawadi and Chindwin valleys (Upper Burma), Seasons 1887–92 and 1895–96, 1902; 22 S.E. and 23 N.E., S.E., Burma and China, Yünnan Province, Seasons 1894–97 and 1899–1900, 1902; 28 S.W., S.E., 29 N.W., N.E., S.E., 30 S.E., 37 N.W., N.E., S.W., China, Se-chuan Province, Seasons 1897–1901, 1902; 29 S.W., China, Yunnan and Se-chuan Provinces, Season 1899–1900, 1902; 30 S.W., 31 N.W., S.W., S.E., 39 S.W., China, Yunnan Province, Seasons 1898–1900, 1902; 38 N.W., S.W., China, Se-chuan and Kuei-chou Provinces, Season 1898–99, 1902.—South-Eastern Frontier, 4 miles to an inch. Sheets: (Fifth Edition) 1 S.E., parts of Upper and Lower Chindwin, Pakokku, Shwebo, Mandalay, and Sagaing districts and Chin Hills (Upper Burma), Seasons 1886–91, 1902; (Seventh Edition) 2 N.E., Upper Burma, parts of districts Lower Chindwin, Sagaing, Minbu, Myingyan, Pakokku, Meiktila, Kyaukse, and Chin Hills, Seasons 1886–90 and 1897, 1902; (Fifth Edition) 5 N.W.,

parts of districts Mandalay, Sagaing, Meiktila, Kyaukse, and Myingyan, and of the Shan States, Seasons 1889–94 and 1897–1901, 1902; 12 S.E., S.W., 20 N.W., China, Yünnan Province, Seasons 1894–95, 1898–1900, 1902.—North-Western Provinces and Oudh Survey, 1 mile to an inch. Sheets: (Preliminary Edition) 69, 84, 99, district Sháhjahánpur, Seasons 1895–97, 1902.—Sind Survey, 1 mile to an inch. Sheets: 10, districts Karachi and Lárkhána, Season 1900–01, 1902; 11, 13, 14, district Karachi, Seasons 1896–97, 1900–01, 1902.—United Provinces of Agra and Oudh and Bengal Surveys, 1 mile to an inch. Sheets: (Second Edition) 204 (U.P.A. and O.), 28 (Bengal), parts of districts Gorakhpur (U.P.A. and O.) and Champáran (Bengal), Seasons 1886–87 and 1895–96, 1902; (Second Edition) 206 (U.P.A. and O.), 29 (Bengal), districts Gorakhpur (U.P.A. and O.) and Saran (Bengal), Seasons 1883–87 and 1893–94, 1902; (Second Edition) 216 (U.P.A. and O.), 54 (Bengal), parts of districts Gorakhpur and Saran, Seasons 1883–84 and 1893–96, 1902; (Second Edition) 321 (Punjab), 8 (U.P.A. and O.), districts Delhi, Gurgaon, Rohtak (Punjab), Meerut and Bulandshahr (U.P.A. and O.), Seasons 1872–77 and 1881–82, 1902.—Assam, district Darrang, 8 miles to an inch, 1902.—Bengal, district Burdwan, 8 miles to an inch, corrected up to 1901, 1902; Chittagong, 8 miles to an inch, corrected up to 1901, 1902; Cuttack, 8 miles to an inch, corrected up to 1901, 1902; Dacca, 8 miles to an inch, corrected up to 1901, 1902; Malda, 8 miles to an inch, corrected up to 1901, 1902.—United Provinces of Agra and Oudh, districts Ballia, 8 miles to an inch, corrected up to 1902; Bánda, 8 miles to an inch, corrected up to 1902; Benares, 8 miles to an inch, corrected up to 1901, 1903; Bijnor, 8 miles to an inch, corrected up to 1901, 1903; Cawnpore, 8 miles to an inch, corrected up to 1901, 1902; Fatehpur, 8 miles to an inch, corrected up to 1901, 1903; Ghazipur, 8 miles to an inch, corrected up to 1901; Mirzapur, 12 miles to an inch, corrected up to 1902.—Korea, Tributary State of Chota Nagpur, 8 miles to an inch, 1902.—Chart of Triangulation, No. 20 party (Burma Forest), 2 miles to an inch. Sheets: 161, 207, 208 (Burma), (New Series), Seasons 1868–69, 1875–76, and 1883–89, and 1891–92, 1902.—Preliminary Chart of the Secondary Triangulation of the Manipur Minor Meridional Series, No. 2 and 3, 4 miles to an inch, Seasons 1900–03.—Index to the Standard Sheets of Central India and Rajputana, 1901.—Index to the Standard Sheets of the North-East and South-East Frontier Series.—Index to the Standard Sheets of the Punjab and North-West Frontier Province, 1902.—Index to the Standard Sheets of H.H. the Nizam's dominions and assigned districts of Berar, 1901. *Presented by H.M. Secretary of State for India, through the India Office.*

Indo-China. **Sérvice Géographique de l'Indo-Chine.**

Carte de l'Indo-Chine. Scale 1:100,000 or 1·6 stat. mile to an inch. Sheets: Hone-Cohe, Nha-Trang, Cam-Linh, Quang-Tri, M'Sao, Da R'Lac, Dan-Kia, Dan-Kia (ouest), Djirinh, Mi-Pou, Tam-Linh, Phu-Dien, Ha-Tinh, Huong-Khe, Vinh, Ron, Dong-Hoi, Phu-Tinh-Gia, Quang-Fri (est). Sérvice Géographique de l'Indo-Chine, 1902–3. *Price* $0·60 *each sheet.*

Peking to Tientsin. **Sérvice Géographique de l'Indo-Chine.**

Region de Tien-Tsin à Pékin. Scale 1:500,000 or 7·8 stat. miles to an inch.—Tien-Tsin. Scale 1:100,000 or 1·6 stat. miles to an inch. Sérvice Géographique de l'Indo-Chine, 1900.

AFRICA.

Africa. **Intelligence Division, War Office.**

Africa. Scale 1:1,000,000 or 15·8 stat. miles to an inch. Sheets: 79, South Abyssinia; 87, Boran. *Price 2s. each.* Scale 1: 250,000 or 3·9 stat. miles to an inch. (Provisional) Sheet 46-I, Khor Langeb. Egyptian Sudan. *Price* 1*s.* 6*d.* London: Intelligence Division, War Office, Stanford, 1903. *Presented by the Director-General of Mobilization and Military Intelligence.*

Africa. **Philip.**

Philip's Comparative Series of large School-maps. Africa. Scale 1: 6,000,000 or 95 stat. miles to an inch. London: George Philip & Son, Ltd. *Price* 16*s. mounted on rollers and varnished. Presented by the Publishers.*

There are two editions of this school wall-map, one showing physical features only, and the other the same with the more important names added. It is orographically coloured, land between sea-level and 600 feet in latitude being shown by dark green, from 600 to 1200 feet light green, from 1200 to 3000 feet light brown, and land above 3000 feet darker brown. In addition to the tinting, the general relief is indicated by vertical hachures. Boundaries are shown by red lines, and towns by symbols in red, varying in form according to importance and population. Water is blue, a paler

tint of which colour indicates the depths of less than 100 fathoms. A small inset of the British Isles on the same scale as the general map is given for comparison of areas, as well as a political map of Africa on one-fourth of the scale. It is to be regretted that the orographical colouring has not been confined to different tints of brown, instead of employing green to represent the land of lower altitude.

East Africa. **Wickenburg.**

Graf Eduard Wickenburg's Reiserouten in Ost-Afrika 1901. Scale: 1 : 1,000,000 or 15·8 stat. miles to an inch. 3 sheets. *Petermanns Geographische Mitteilungen*, Jahrgang 1903, Taf. 16, 17, 18. Gotha: Justus Perthes. *Presented by the Publisher.*

Egypt. **Public Works Department, Cairo.**

Egypt.—Behera Province, scale 1 : 50,000 or 0·78 stat. mile to an inch, Sheet 14. Girga Province, scale 1 : 25,000 or 0·39 stat. mile to an inch, Sheets 7, 8, and 10. Gharbia Province, scale 1 : 10,000 or 0·15 stat. mile to an inch, Sheets 30–9, 30–10, 31–9, and 31–10 N.E. Cairo: Public Works Department, Survey Department. *Presented by the Director-General of the Survey Department, Cairo.*

The Egyptian Survey Department, under the superintendence of Captain H. G. Lyons, R.E., is doing most excellent work, as is evidenced by the above survey sheets, which have recently been presented to the Map Room of the Society. The Behera sheet, on the scale of 1 : 50,000, forms part of a large map of Egypt now in course of preparation; the remainder are sheets of maps of separate provinces on the scale of 1 : 10,000, 1 : 25,000, and 1 : 50,000. In most cases the lettering is in Arabic and English. The maps are clearly printed in colours, which have been well chosen.

Katanga. **Droogmans.**

Carte du Katanga (territoires gérés par le Comité Special du Katanga). Dressée par H. Droogmans. Scale 1 : 1,000,000 or 15·8 stat. miles to an inch. 2 sheets. Brussels, 1903. *Presented by M. Hubert Droogmans.*

This map embraces the region to the west of Tanganyika and Bangweulu as far as the Sunkuru river, and between latitudes 4° 30′ and 14° S. The work of Captain Lemaire has been utilized in the compilation, but the recent route surveys of Mr. G. Grey have not been taken full advantage of. Until more exact surveys have been carried out, the greater number of the positions must be considered as extremely approximate.

Spanish Guinea. **d'Almonte.**

Muni. Guinea Continental Española. Por Enrique d'Almonte. Scale 1 : 200,000 or 3·15 stat. miles to an inch. Vocal da la Comisaria Regia de España en el Africa Occidental. Publicado de Real Orden por el Ministerio de Estado. Madrid, 1903. 2 sheets. Supplement to the *Boletín de la Real Sociedad Geográfica*, Madrid, vol. xliv.

The Spanish West African possession of Muni is situated on the coast between the French Congo and German Kamerun regions. It is but very imperfectly explored, and such maps as exist have been drawn from rough route sketches. The present map is certainly the most complete that has hitherto been published, but even here many districts are left blank or roughly sketched in. The coast-line has been taken from the British Admiralty Charts and other hydrographical surveys, and the interior of the map is drawn from the route-surveys of numerous travellers, including those of the late M. P. du Chaillu.

AMERICA.

Argentine Republic. **Ministerio de Obras Públicas.**

Mapa de los Ferro Carriles de la República Argentina. Año 1901. Scale 1 : 2,000,000 or 31·5 stat. miles to an inch. 2 sheets. [Buenos Aires]: Ministerio de Obras Públicas.

An outline map of the Argentine Republic, printed in colours, without hillwork, showing railways up to 1901. There are six inset plans of towns on enlarged scales.

Canada. **Almon and Spence.**

Map showing the Railways of Canada, to accompany the Annual Report on Railway Statistics, 1903. Scale 1 : 2,724,480 or 43 stat. miles to an inch. Compiled and drawn by A. U. Almon under the supervision of J. B. Spence, C.E., Chief Draftsman, Department of Railways and Canals, Canada. 3 sheets. *Presented by the High Commissioner for Canada.*

Shows clearly, in red, railways in operation and under construction up to January 1 of the present year. Each line bears a number, corresponding to a similar number in an index, from which the name can be found, which system prevents overcrowding

on the map itself. No hillwork has been attempted. Apart from the special object for which the map has been published, it will be useful for general reference, owing to the large scale upon which it has been drawn, and the amount of detail given.

Canada. **Surveyor-General's Office, Ottawa.**

Sectional Map of Canada. Scale 1 : 190,080 or 3 stat. miles to an inch. Regina Sheet (43), West of Second Meridian; revised to May 8, 1903. Spillimacheen Sheet (89), West of Fifth Meridian; revised to June 24, 1903. Sicamous Sheet (91), West of Sixth Meridian; revised to June 4, 1903. Lytton Sheet (94), West of Sixth Meridian; revised to June 24, 1903. Ottawa: Surveyor-General's Office, 1903. *Presented by the Surveyor-General of Canada.*

These are new editions, revised up to May and June of this year. They are especially important sheets, inasmuch as they are in the vicinity of the Canadian Pacific railway. No. 91 (Sicamous) shows the line from the Illecillewaet river to below Shuswap.

Canada. **Canadian Emigration Department.**

Map of the Dominion of Canada, 1903. Scale 1 : 3,674,880 or 58 stat. miles to an inch. Issued by direction of Hon. Clifford Sifton, Minister of the Interior. From latest information furnished by James White, F.R.G.S., Geographer, Department of the Interior, Canada. Ottawa, 1903. *Presented by the Canadian Emigration Department.*

This is a general map of Canada, prepared for general distribution amongst intending emigrants and others who may be thinking of settling in the Dominion. Recent survey work and reproduction of photographs of public buildings, farms, and useful statistical tables are given in the spare spaces upon the map.

GENERAL.

World. **Darbishire and Stanford.**

Map of the World, on an Equal Area Projection, showing Britain and all the British Dominions beyond the Seas. Oxford: Darbishire & Stanford. *Price 6d. Presented by the Publishers.*

This is a small general outline map of the world on Mollweide's Equal Area Elliptical Projection, by which the relative areas of countries are maintained, thus giving a far more truthful representation of their proportion to another than Mercator's, which is most misleading in this respect. The British Dominions are coloured red, the rest of the map being in black. The map measures about 9 inches by 18, and a square inch on any part represents 1,600,000 square miles. It is satisfactory to find that an attempt is being made in this country to produce educational maps of the world upon this projection, which, whenever the question of relative areas of different regions is concerned, can be recommended for showing the world as a whole. The drawback is that towards the limits of the maps the countries are distorted as to form and configuration.

World. **Darbishire and Stanford.**

The Autograph Hand-maps. A new series of penny outline maps. British Isles, scale 1 : 2,750,000 or 43·4 stat. miles to an inch; England and Wales, scale 1 : 2,000,000 or 31·5 stat. miles to an inch; Scotland, Scale 1 : 1,500,000 or 23·6 stat. miles to an inch; Ireland, scale 1 : 1,500,000 or 23·6 stat. miles to an inch; Europe, scale 1 : 20,000,000 or 315·6 stat. miles to an inch; Africa, scale 1 : 30,000,000 or 473·4 stat. miles to an inch; North America, scale 1 : 30,000,000 or 473·4 stat. miles to an inch; South America, scale 1 : 30,000,000 or 473·4 stat. miles to an inch; Australasia, scale 1 : 30,000,000 or 473·4 stat. miles to an inch; Greece, Scale 1 : 1,500,000 or 23·6 stat. miles to an inch; Italy, scale 1 : 4,000,000 or 63·1 stat. miles to an inch; The Netherlands, scale 1 : 2,000,000 or 31·5 stat. miles to an inch; Central Europe, scale 1 : 7,500,000 or 118·3 stat. miles to an inch; the Danube Lands, scale 1 : 5,000,000 or 78·9 stat. miles to an inch; The Nearer East, scale 1 : 15,000,000 or 236·7 stat. miles to an inch; the Mediterranean Region, scale 1 : 12,000,000 or 189·4 stat. miles to an inch. Oxford: Darbishire & Stanford. *Presented by the Publishers.*

A series of small outline maps without names, on various scales, showing the general configuration of the land by dull brown shading. They have been carefully drawn, and are so arranged that additional matter, such as geological features, distribution of population, etc., can be coloured upon them.

World. **Philip.**

Philip's "Diagram" Hand Atlas. Designed by B. B. Dickinson, M.A., F.R.G.S., and A. W. Andrews, M.A., F.R.G.S. London: George Philip & Son, Ltd. *Price 3s. net. Presented by the Publishers.*

These are the orographically coloured "Diagram" Hand Maps by Messrs. Dickinson and Andrews which have been noticed from time to time in the *Geographical Journal* as they have appeared. They are now brought together in atlas form, in which they will be doubtless found useful.

World. **Philip.**

Philip's London School Board Atlas. A series of 44 coloured plates, containing over 98 maps and plans, printed in colours, and 8 pages of introductory letterpress. Edited by George Philip, F.R.G.S. *Price 1s. 3d. net.*—Philip's Atlas of Comparative Geography for Junior Classes. A series of 40 coloured plates, containing over 90 maps and diagrams, with 8 pages of introductory letterpress and index. Edited by George Philip, F.R.G.S.—Philip's Sixpenny Atlas of Comparative Geography. Edited by George Philip, F.R.G.S. London: George Philip & Son, Ltd. *Presented by the Publishers.*

These are all published with a view of supplying the present demand, which, it is satisfactory to note, has been increasing of late, for cheap school atlases prepared in accordance with the more enlightened methods of geographical education. In all of them attention has been specially given to the representation of the physical features, and orographically coloured maps hold a prominent place. Their extremely moderate price will bring them within the reach of all.

World. **Stieler.**

Neue, neunte Lieferungs-Ausgabe von Stielers Hand-Atlas, 100 Karten in Kupferstich, 21 and 22 Lieferung. Gotha: Justus Perthes. *Price 60 pf. each part.*

These two parts, which are in one cover, consist of the following sheets: No. 26, France, General, by C. Vogel, 1:3,700,000. No. 31, Spain and Portugal, by C. Vogel, 1:3,700,000. Nos. 44 and 45, Russia, sheets 1 and 2, 1:3,700,000, by H. Kehnert and H. Habenicht. The sheets of France and Spain are revisions, but those of Russia are entirely new.

CHARTS.

Admiralty Charts. **Hydrographic Department, Admiralty.**

Charts and Plans published by the Hydrographic Department, Admiralty, during July and August, 1903. *Presented by the Hydrographic Department, Admiralty.*

No.	Inches.	
1859 m =	4·6	England, west coast:—King road. 1s. 6d.
3337 m =	6·9	England, east coast. River Thames:—London Bridge to Woolwich. 2s. 6d.
1471 m =	20·8	Ireland, east coast:—Kingstown harbour. 1s. 6d.
3345 m =	4·0	France, north-west coast:—Chenal du Four. 2s. 6d.
3342 m =	{8·0 / 6·0}	Greece. Port Kaio:—Githion. 1s. 6d.
3317 m =	3·0	Newfoundland, east coast:—Thimble Tickles to Bagg head, including New bay. 3s.
3373 m =	4·85	West Indies. Puerto Rico Island:—Mayaguez bay. 1s. 6d.
478 m =	7·36	West Indies. Puerto Rico:—Port San Juan. 1s. 6d.
3376 m =	{2·9 / 9·0}	Plans on the north coast of South America:—Approaches to Guanta harbour. Guanta harbour. 1s. 6d.
3318 m =	0·05	South America, west coast:—St. Elena point to Gulf of Dulce. 2s. 6d.
3327 m =	0·24	Mexico, south-west coast:—Cape San Lucas to Espirito Santo and Sta. Margarita Island. 2s. 6d.
3193 m =	{2·4 / 7·26 / 2·1}	Philippine islands. Port Sebu and approaches:—Sebu anchorage, Tinaan anchorage. 2s.
3329 m =	5·0	China, east coast. Mirs bay:—Tolo harbour and adjacent anchorages. 3s.
3334 m =	0·16	Japan, Nipon island, east coast. Tokyo to Sendai bay. 2s. 6d.
2655 m =	3·1	Nipon, south coast:—Approaches to Shimoda harbour. 1s. 6d.
1945 m =	3·9	Nipon, Kii channel:—Tanabe Wan. 1s. 6d.
3375 m =	{7·0 / 4·0}	Plans on the south coast of Japan. Hososhima Ko. Shimizu Ko. 1s. 6d.

288 m = {1·3 / 2·8} Russian Tartary:—Ussuri bay. (Plan: Andriva bay.) 2*s.* 6*d.*

3332 m = 0·5 New Zealand, North island, east coast:—Mercury bay to Town point. 2*s.* 6*d.*

479 West Indies. Anchorages in Puerto Rico island. Plan added:—Port Arecibo.

632 Walfisch bay to Orange river. New plan:—Possession Road.

2597 China sea. Banke strait. Plan added:—Muntok road.

1622 Ports in the Philippine islands. Plan added:—Parasan harbour and approaches.

3216 Japan. Plans on the east coast of Nipon island. Plans added:—Oginohama ko. Hirota wan.

357 Japan. Harbours in Kii channel. New plan:—Osaki bay.

(*J. D. Potter, Agent.*)

Charts Cancelled.

No.		Cancelled by	No.
1859	King road.	New plan. King road	1859
1471	Kingstown harbour.	New plan. Kingstown harbour	1471
1685	Gythium. Plan on this sheet.	New plan. Port Kaio. Githion (Gythium)	3342
479	Mayaguez bay. Plan on this sheet.	New plan. Mayaguez bay	3373
478	Port San Juan. Port Arecibo.	New plan. Port San Juan	478
1523	Ports and anchorages on the north coast of South America. Plan of Guanta harbour on this sheet.	New plan. Guanta harbour	3376
632	Walfisch bay to Orange river. Plan of Elizabeth bay on this sheet.	New plan. Possession road	632
2655	Simoda harbour.	New plan. Approaches to Shimoda harbour	2655
357	Harbours in the Kii channel. Plan of bay of Tanabé on this sheet.	New plan. Tanabe wan	1945

Charts that have received Important Corrections.

No. 3038, Norway:—Biörnsud to Kristiansund. 2274, White sea, sheet vi.:—Kamennoi point and Unshaya inlet, etc. 2276, White sea, sheet viii.:—Buin point to Sharapov head. 2970, Novaya Zemlya:—Sukhoi Nos to north Gusini Nos. 3035, Plans in Novaya Zemlya. 1461, Italy:—Genoa. 280, Newfoundland:—Notre Dame bay. 314, North America:—River St. Lawrence, Orignaux point to Goose island. 519, North American lakes:—Lake Huron. 853, United States, east coast:—St. Andrew sound to St. John's river. 1911, United States, west coast:—Approach to Juan de Fuca strait. 634, British Columbia:—Port Harvey. 40, India, west coast:—Karáchi harbour. 2149, Eastern archipelago:—Banka strait. 942B, Eastern archipelago, eastern portion. 999, Siam:—Bangkok river. 1459, China, east coast:—Hongkong harbour. 1602, China:—Approaches to the Yang-tse-kiang. 861, Russian Tartary:—River Amur, sheet i. 862, Russian Tartary:—River Amur, sheet ii. 2119, Australia, east coast:—Newcastle harbour. 764, Pacific (western):—New Hanover, New Ireland, and New Britain. 1423, New Zealand:—Port Nicholson.

(*J. D. Potter, Agent.*)

North Atlantic Ocean and Mediterranean Sea. **Meteorological Office.**

Pilot Chart of the North Atlantic and Mediterranean for September and October, 1903. London: Meteorological Office. *Price* 6*d.* *Presented by the Meteorological Office, London.*

United States Charts. **United States Hydrographic Office.**

Pilot Chart of the North Atlantic for August and September, and of the North Pacific for September and October, 1903. U.S. Hydrographic Office, Washington, D.C. *Presented by the U.S. Hydrographic Office.*

PHOTOGRAPHS.

Abyssinia. **Hindlip.**

Sixty-three Photographs of Abyssinia, taken by Lord Hindlip. *Presented by Lord Hindlip.*

Many of these photographs serve well to illustrate the natives and character of the country through which Lord Hindlip travelled, and the subjects are well selected.

(1) The expedition's camp in the Oderali country; (2) Bridge over Hawash river, south of Addis Abeba, built by Indian workmen; (3) Two of Lord Hindlip's Somalis; (4) Four of Lord Hindlip's Abyssinian mule-men; (5) Native bridge over a tributary of the Katara river; (6) Gallas at Sidamo; (7) Jibouti; (8) Jibouti railway; (9) Lord Hindlip and two of his boys; (10) Polo at Addis Abeba; (11) Lepers, south-west of Lake Zwai; (12) Mr. F. W. Whitehouse and two boys; (13 and 37) Oderali women; (14) Abyssinian priests begging at British agency; (15) Tree bridge north-east of Lake Margherita; (16) A river-bed; (17) Crossing a dry river, Guguna country; (18) Market-place at Wessa; (19) Five of Lord Hindlip's Abyssinians; (20) The caravan in the bush; (21) A zebra; (22) Entrance to bridge over Hawash river, south of Addis Abeba, made by Indians; (24) The kitchen of the expedition; (25) Gallas hunting; (26) The cook box; (27) Shelter made of camel mats; (28) Rush path over swamp joining two parts of Lake Abasso; (29) Lord Hindlip and dog; (30) Track near Errer, north of Addis Abeba; (31) Colonel Harrington at Addis Abeba; (32) Camp in the Danakil country; (33) Gallas, south-west of Lake Zwai; (34) Galla watch-hut in tree, used by natives to watch their crops; (35) A tributary of the Margherita; (36) Crossing a river; (38) Camp at Ghobe; (39) The Hawash river; (40 and 41) Galla chief, south-west of Lake Zwai; (42) Abyssinian huts at Balghi; (43) Oderali natives; (44) Oderali camels shifting village; (45) British agency, Addis Abeba; (46) Colonel Harrington and Captain Duff; (47) Harar; (48) Colonel Harrington's escort; (49) Maki river; (50) Track east of Lake Margherita; (51 and 52) Katara river; (53 and 54) Crossing Katara river; (55) Track south-east of Lake Zwai; (56) Crossing a corner of Lake Zwai; (57) Islands in Lake Zwai; (58) Gallas; (59) Zwai Galla women; (60) Zwai Gallas; (61) Gallas east of Lake Zwai; (62 and 63) Gallas west of Lake Zwai.

Argentine Republic.

Photograph of the Magnetic and Meteorological Observatory on the Island of Ano Nuevo. *Presented by the Ministerio de Marina, Republica Argentina.*

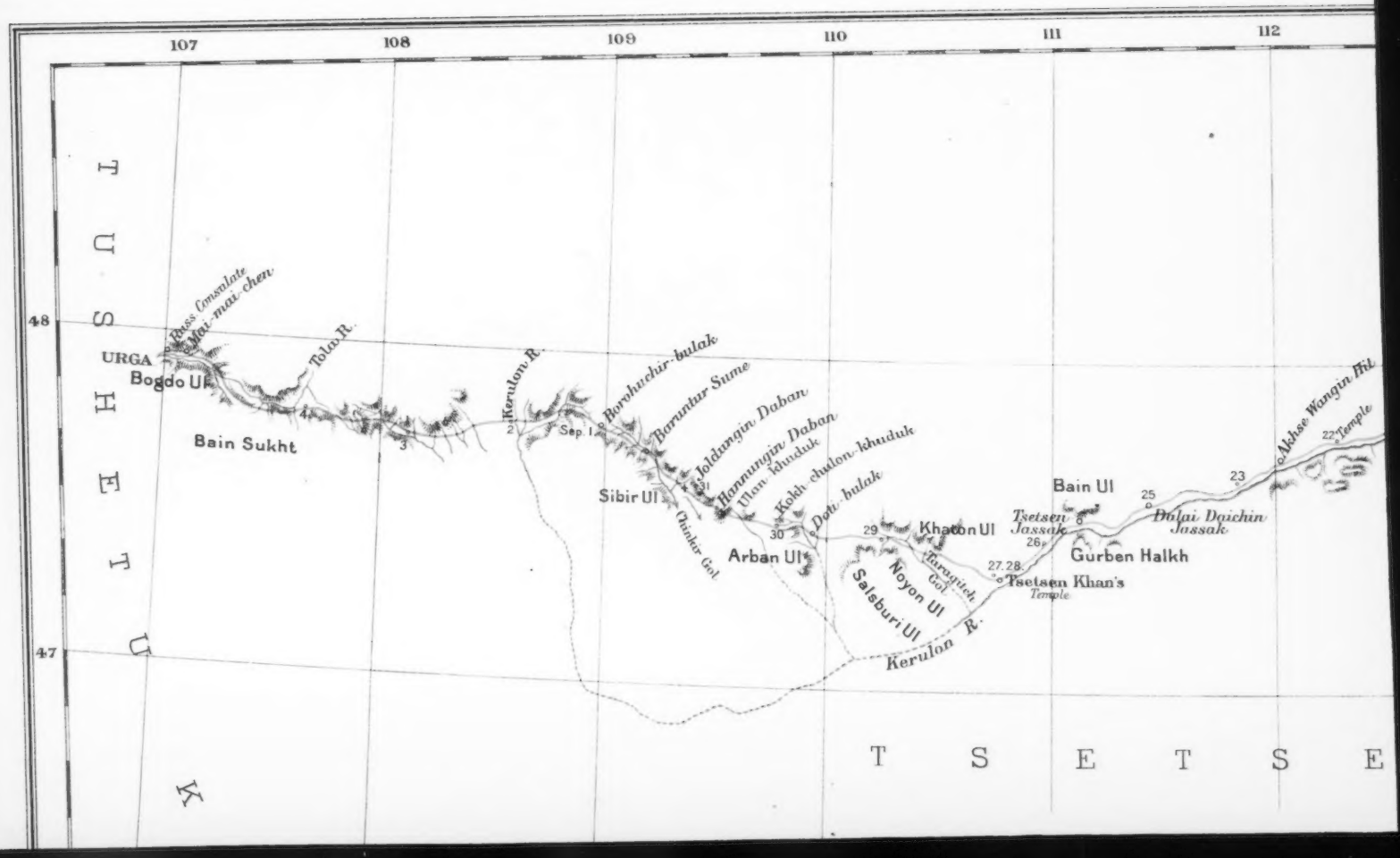
Burma. **Sternberg.**

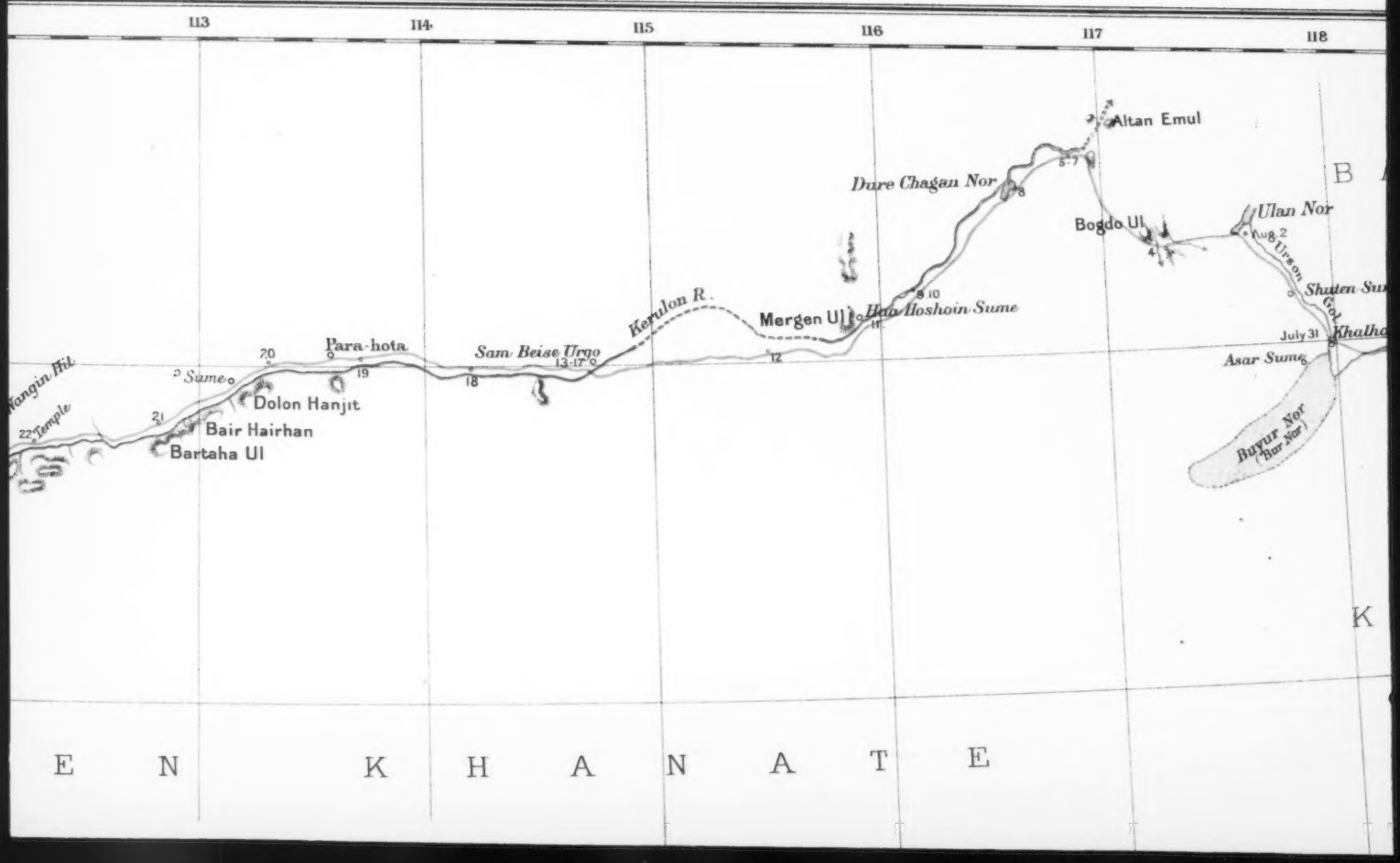
Twenty-six Photographs of Burma, taken by F. R. Sternberg, Esq. *Presented by F. R. Sternberg, Esq.*

These form a welcome addition to the photographs which Mr. F. Sternberg has previously presented to the Society, of regions he has visited. They are a remarkably clear little set, principally of river scenery and pagodas.

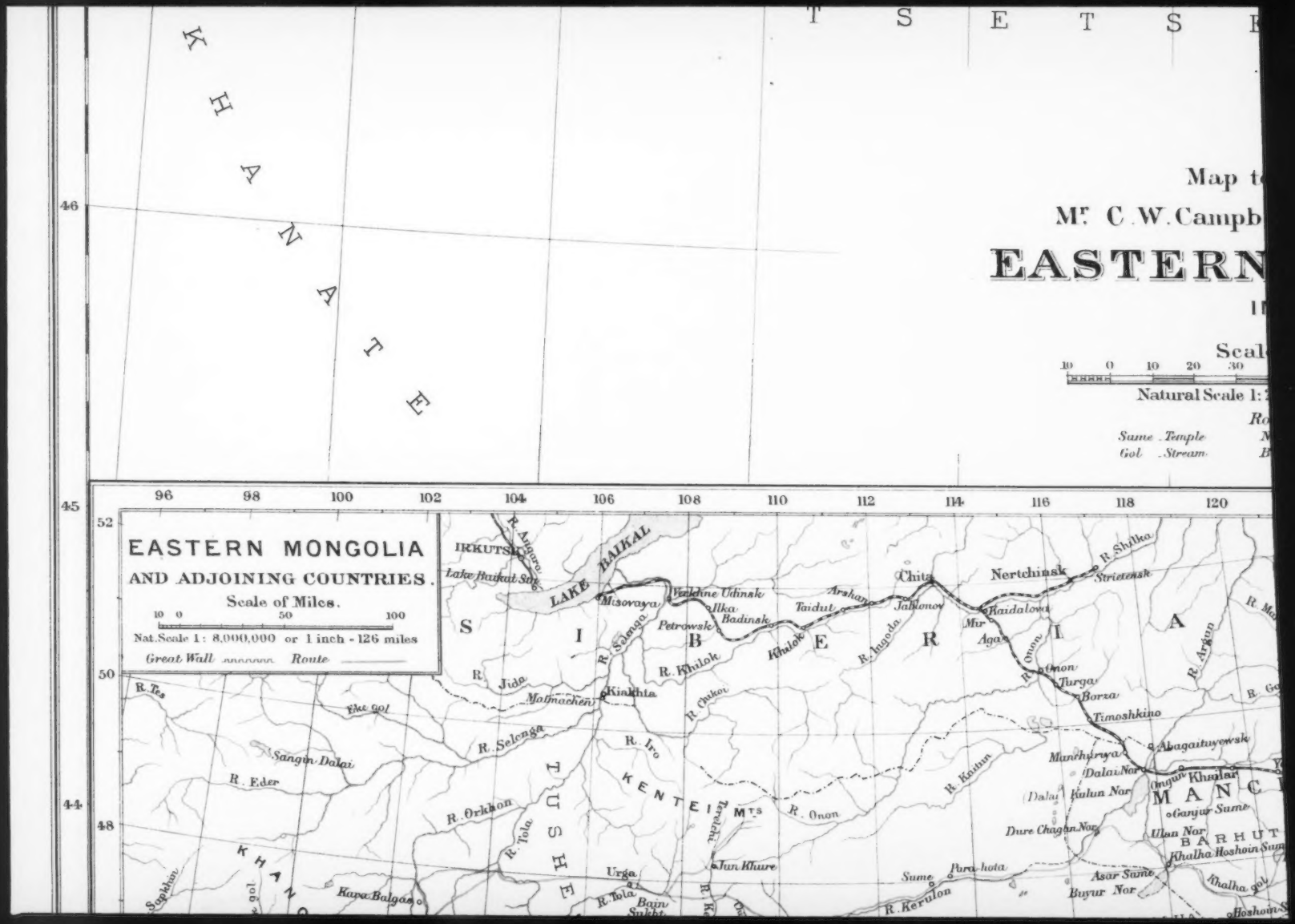
(1) Group of Shans returning from a pilgrimage; (2) Shive Dagon pagoda, Rangoon; (3) Buddhist priest at morning prayer; (4) Morning devotions, Shive Dagon pagoda, Rangoon; (5 and 6) Chapels and altars in the Shive Dagon pagoda; (7) A quiet smoke; (8) Moat, bridge, tower, and wall, Mandalay; (9) Entrance to ex-king Theebaw's palace, Mandalay; (10) Summer-house in garden of palace; (11) The queen's apartments; (12) My dormitory, Upper Burma club; (13) The Centre of the Universe, Mandalay; (14) General view of the 450 pagodas, Mandalay; (15) One of the 450 pagodas; (46) Engraved stone, with Sanscrit inscription of one of the Holy Books of Buddhism under one of the 450 pagodas, Mandalay; (17) Irawadi Company's steamer *Beeloo*, with a flat on either side; (18) Indian steersman and Burmese pilot on the steamer *Beeloo;* (19 and 20) Native passengers on the steamer *Beeloo;* (21) Rice-boat on the river Irawadi; (22) Rice-boat on the river Irawadi, showing carved stern; (23) Fort Minhla; (24) Tenangyat, on the Irawadi; (25) Burmese passengers coming off the steamer in a dugout; (26) Shivesandaw pagoda, Prome.

N.B.—It would greatly add to the value of the collection of Photographs which has been established in the Map Room, if all the Fellows of the Society who have taken photographs during their travels, would forward copies of them to the Map Curator, by whom they will be acknowledged. Should the donor have purchased the photographs, it will be useful for reference if the name of the photographer and his address are given


107
108
109
110
111
112
48
47
T U S H E T U K
T S E T S E
URGA
Bogdo Ul
Pass Umsalate
Mai-mai-chen
Tola R.
Bain Sukht
Kerulon R.
Sep. I.
Borohuchir-bulak
Baruntur Sume
Joldangin Daban
Hannungin Daban
Ulan Khuduk
Kokh-chulon-khuduk
Dotu-bulak
Sibir Ul
Chuntur Gol
Arban Ul
Salsburi Ul
Noyon Ul
Khaton Ul
Taraqutch Gol
Kerulon R.
Bain Ul
Tsetsen Jassak
Dolai Daichin Jassak
Gurben Halkh
Tsetsen Khan's Temple
Akhse Wangin Hil
Temple
29
30
26
27.28
25
23
27


113
114
115
116
117
118
Altan Emul
Dure Chagan Nor
Bogdo Ul
Ulan Nor
Aug. 2
Ureon Gol
Shuten Sur
July 31
Khalho
Asar Sume
Buyur Nor
(Bor Nor)
Kerulon R.
Mergen Ul
Hun Hoshoin Sume
Sam Beise Urgo
Para-hota
Dolon Hanjit
Bair Hairhan
Bartaha Ul
Sume
Temple
E N K H A N A T E

118
119
BARHUT
Nor
Shuten Sume
Gol
31
Khalha Hoshoin Sume
48
29
Ikhe Borhan Sume
Khalha Gol
Hoshoin Sume
25
KHALHA
24
Chagan Cholotan Gol
47
Gun Gegenin Sume
Narin Gol
23
Burte Nor
Loho Sume


T S E T S
K H A N A T E
Map t
Mr. C. W. Campb
EASTERN
Scal
Natural Scale 1:
Sume Temple
Gol Stream
EASTERN MONGOLIA
AND ADJOINING COUNTRIES.
Scale of Miles.
Nat. Scale 1: 8,000,000 or 1 inch = 126 miles
Great Wall
Route
LAKE BAIKAL
IRKUTSK
Lake Baikal Sea
R. Angara
Misovaya
Verkhne Udinsk
Ilka
Badinsk
Petrowsk
R. Selenga
R. Khilok
Khilok
Chita
Nertchinsk
R. Shilka
Stretensk
Tsidut
Arshan
Jahlonov
Kaidalowa
Mir
Aga
R. Ingoda
R. Onon
R. Argun
Turga
Borza
Timoshkino
Abagaituyewsk
Manchuriya
Dalai Nur
Hulun Nur
Ganjur Sume
Dure Chagan Nur
Ulan Nur
Khalha Hoshoin Sume
Khalha gol
Asar Sume
Buyur Nur
Sume
Para hota
R. Kerulon
Urga
Jun Khure
Kara Balgas
Sukhbaatar
R. Tola
R. Orkhon
R. Iro
R. Jida
R. Tes
Ekc gol
Matmachen
Kiakhta
R. Chikoi
R. Kaitun
Dalai Nur
Onguir Khaalar
Tsetsi
Sangin Dalai
R. Eder
KENTEI MTS
TUSHETU KHAN
KHANGAI MTS
BARHUT
MANC
SIBERIA
52
50
48
44
45
96
98
100
102
104
106
108
110
112
114
116
118
120

E N K H A N A T E

ap to illustrate

mpbell's Route through

RN MONGOLIA

IN 1902.

Scale of Miles.

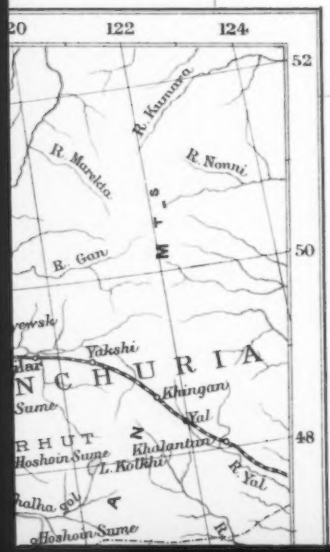
30 40 50 100

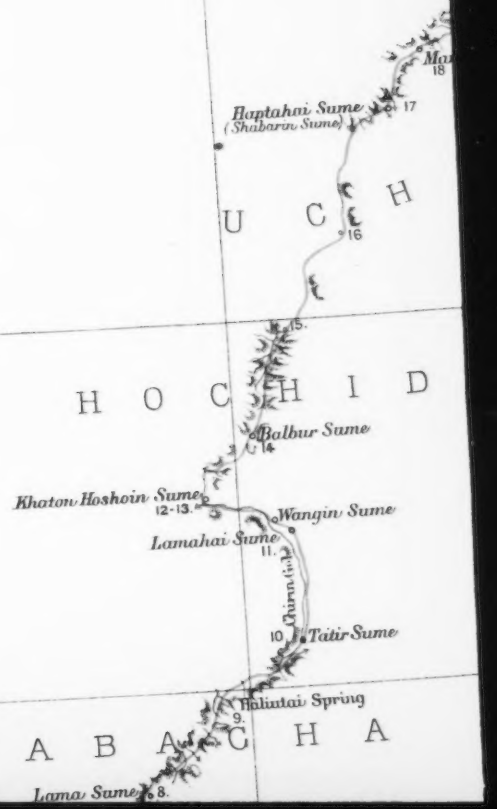
cale 1: 2000000 or 1 inch = 31·56 Miles.

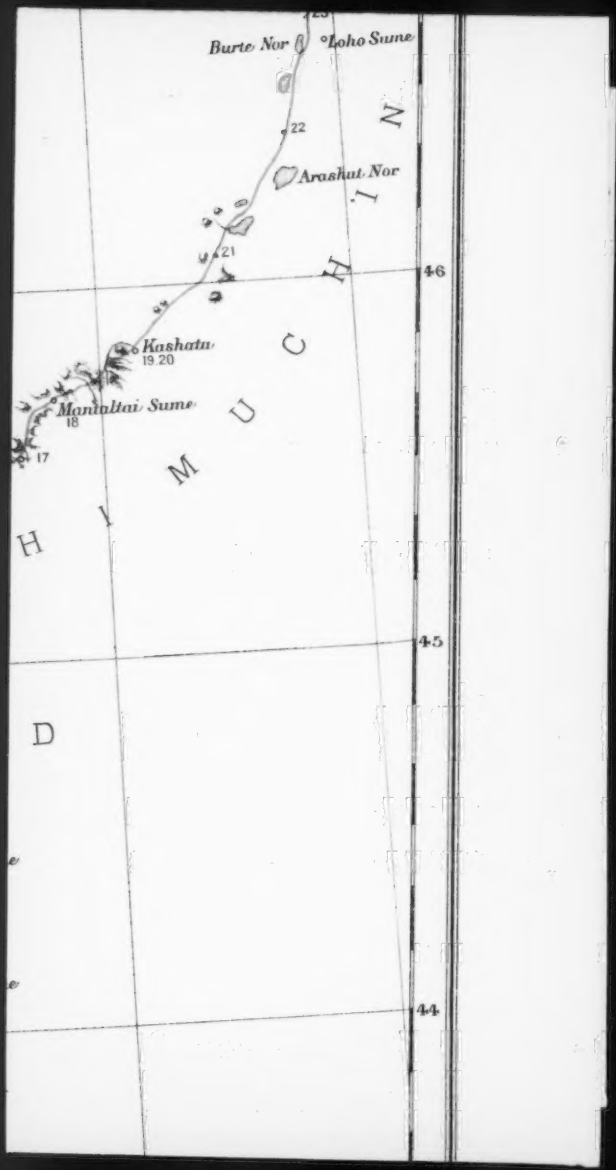
Route ——

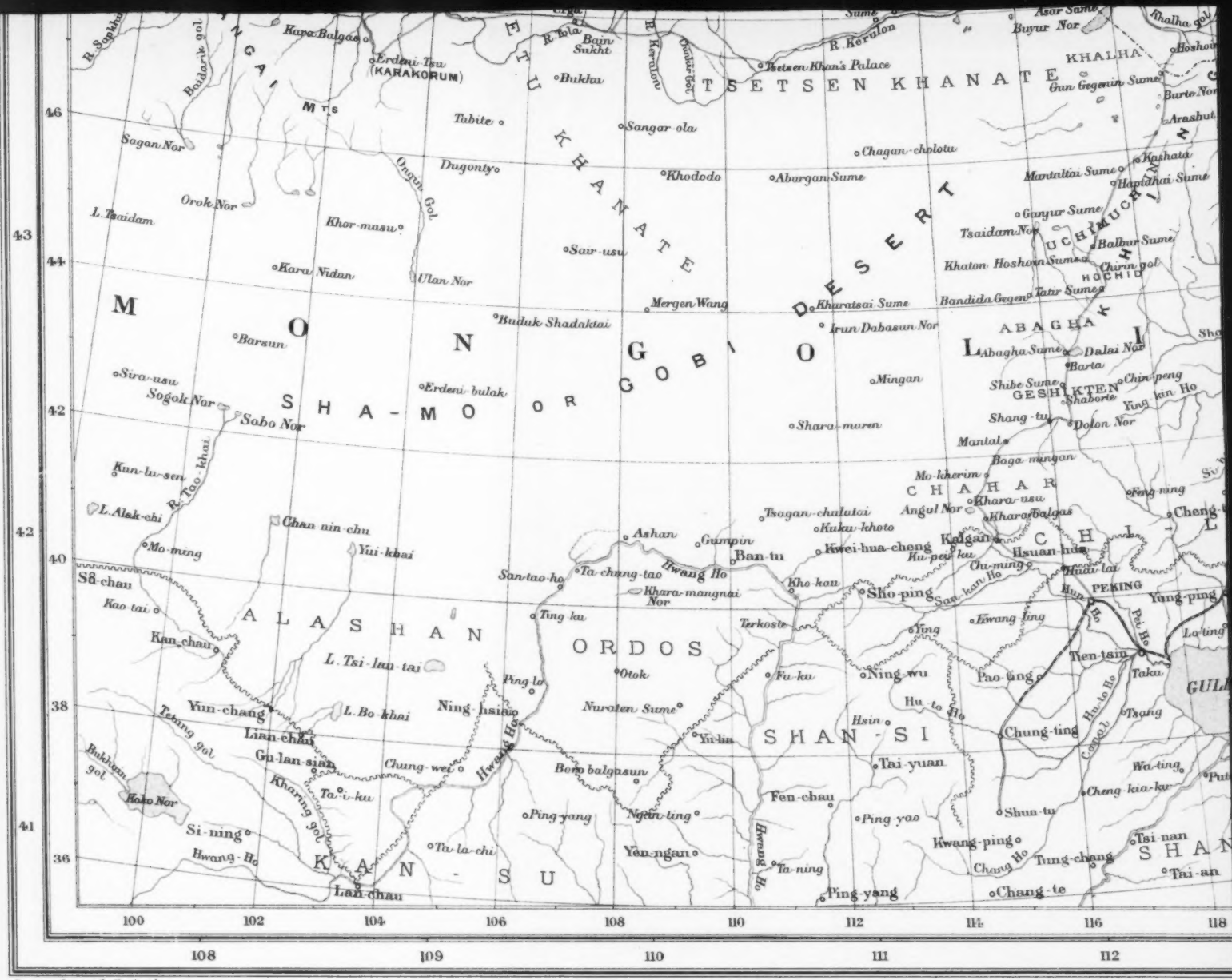
Nor . Lake *Daban . Pass*

Bulak . Spring *Ul . Hill*

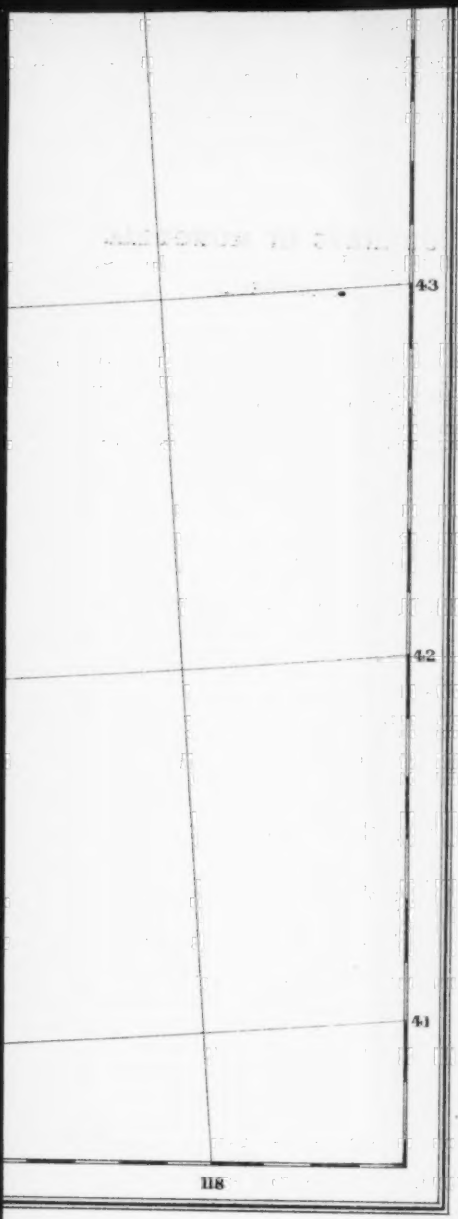





Burte Nor
Loho Sume
22
Araskat Nor
21
46
Kashatu
19.20
Manialtai Sume
18
17
45
44


KHALHA
TSETSEN KHANATE
KHANATE
DESERT
GOBI
MONGOLIA
SHA-MO OR
ALASHAN
ORDOS
KAN-SU
SHAN-SI
CHAHAR
ABAGHAK
GESHIKTEN
HOCHIO
PEKING
KARAKORUM
Sagan Nor
Orok Nor
Sogok Nor
Soho Nor
Koko Nor
Barsun
Dugonty
Tabite
Bukdu
Sangar-ola
Chagan-cholotu
Khododo
Aburgan Sume
Sair-usu
Mergen Wang
Khuratsai Sume
Irun Dabasun Nor
Budak Shadaktai
Kara Nidan
Ulan Nor
Khor-musu
L. Tsaidam
Erdeni-bulak
Mingan
Shara-muren
Ashan
Gumpin
Ban-tu
Kwei-hua-cheng
Kalgan
Hsuan-hua
Ta-chang-tao
Hwang Ho
Kho-kau
Sho-ping
Khara-mangnai Nor
Ting-kau
Terkoste
Ejwang Jing
Ning
Otok
Fu-ku
Ning-wu
Pao-ting
Tien-tsin
Taku
Yun-chang
Ning-hsiang
Nuraten Sume
Hsin
Yu-lin
Chung-ting
Tai-yuan
Fen-chau
Ping-yao
Shun-tu
Ping-yang
Ngan-ling
Yen-ngan
Ta-ning
Kwang-ping
Tung-chang
Chang-te
Tai-an
Lan-chau
Si-ning
Kan-chau
Su-chau
Kao-tai
Mo-ming
Kan-lu-sen
L. Alak-chi
Chan-nin-chu
Yui-khai
L. Tsi-lan-tai
L. Bo-khai
Gu-lan-sian
Chung-wei
Hwang Ho
Ta-la-chi
Ta-i-ku
Kharing gol
Bukhain gol
Tebing gol
Baidarik gol
Kara Balgas
Erdeni Tsu
Bain Sakht
R. Tola
R. Kerulon
Tsetsen Khan's Palace
Asar Sume
Buyur Nor
Khalha gol
Gun Gegenin Sume
Burte Nor
Arashut
Kashata
Mantaltai Sume
Haptalhai Sume
Granyur Sume
Tsaidam Nor
Balbur Sume
Khaton Hoshoun Sume
Churin gol
Bandida Gegen
Tatar Sume
Abagha Sume
Dalai Nor
Barta
Shibe Sume
Chin-peng
Shaborte
Ying kan Ho
Shang-tu
Dolon Nor
Mantala
Baga mingan
Mo-kherim
Khara-usu
Khara-balgas
Feng-ning
Tsagan-chulutai
Angul Nor
Kuku-khoto
Ku-pei-ku
Chu-ming
Hsuan-lai
Yang-ping
Ejwang Jing
Pei Ho
Lo-ting
Takn
Tsang
Hu-to Ho
Wa-ting
Cheng-kia-ku
Tsi-nan
Tai-an
Chang Ho
Tung-chang
Hwang Ho
Yun-lin
Ping-lo
Ping-yang

Published by the Royal Geographical Society.


43
42
41
118

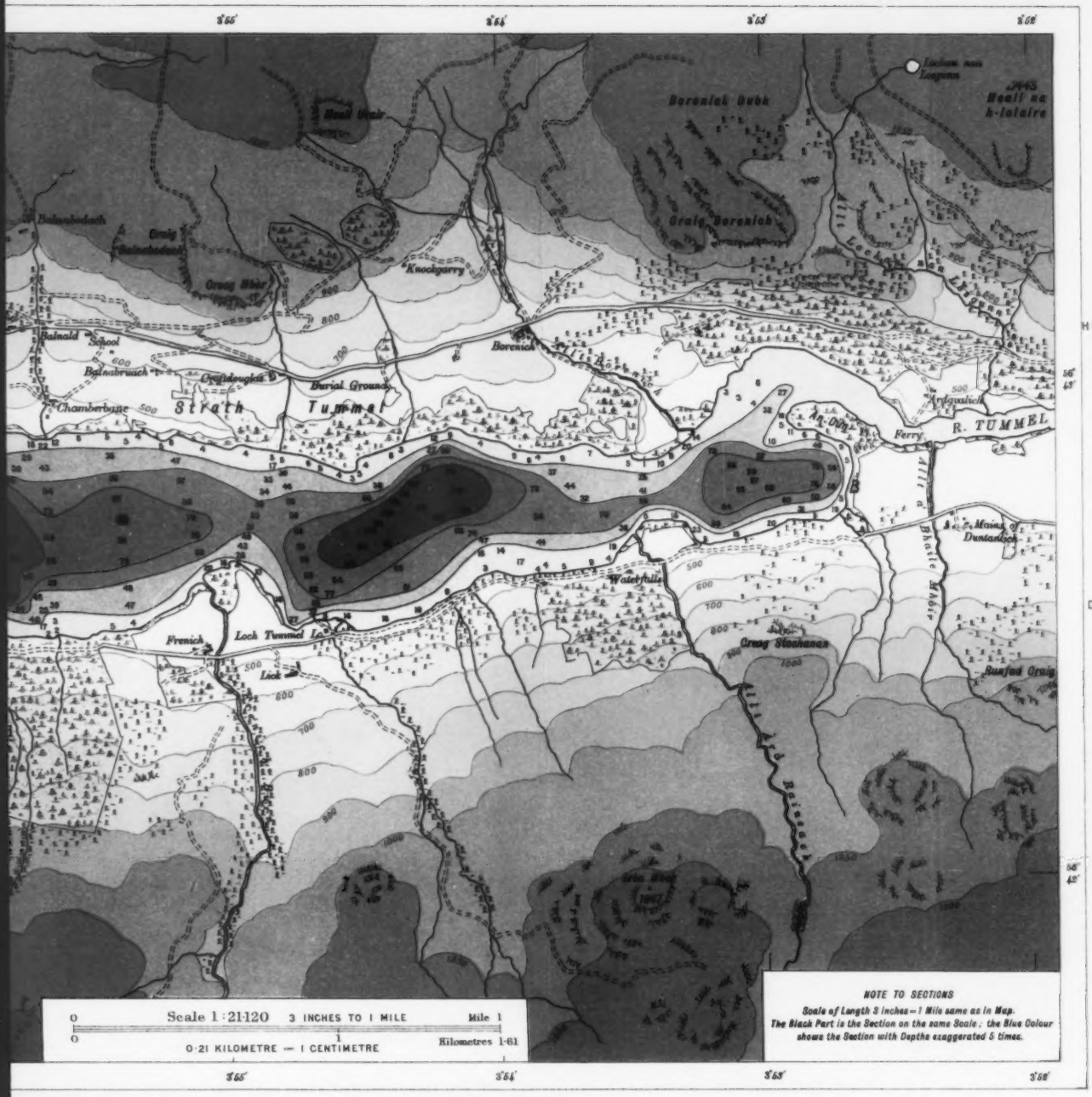
LOCH TUMMEL

(TAY BASIN)

SURVEYED IN 1902 BY T. N. JOHNSTON, M.B., C.M., JAMES PARSONS, B.Sc., R. M. CLARK, B.Sc., AND D. C. M'INTOSH, M.A.

Height of Surface of Water above Sea Level, 454·5 feet

The Land Contours are from the Ordnance Survey



HEIGHTS IN FEET

FEET	METRES
1500	457·2
1250	381·1
1000	304·8
900	274·3
800	243·8
700	213·4
600	182·9
500	152·4

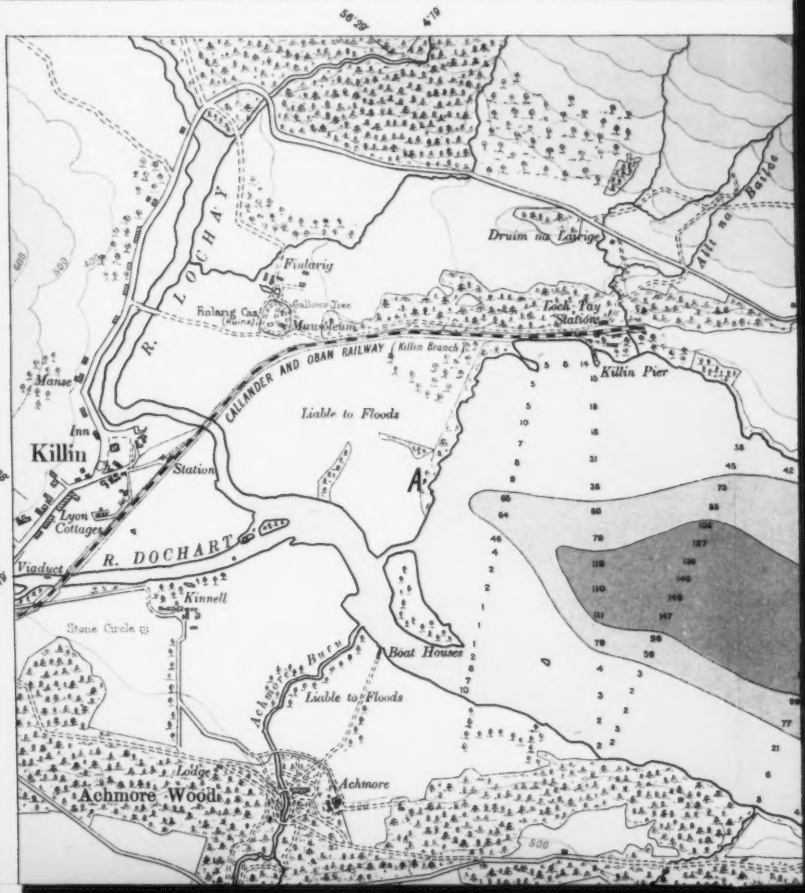
DEPTHS IN FEET

FEET	METRES
25	7·6
50	15·2
75	22·9
100	30·5
125	38·1

LONGITUDINAL SECTION ALONG AXIS OF MAXIMUM DEPTH

Published by the Royal Geographical Society.

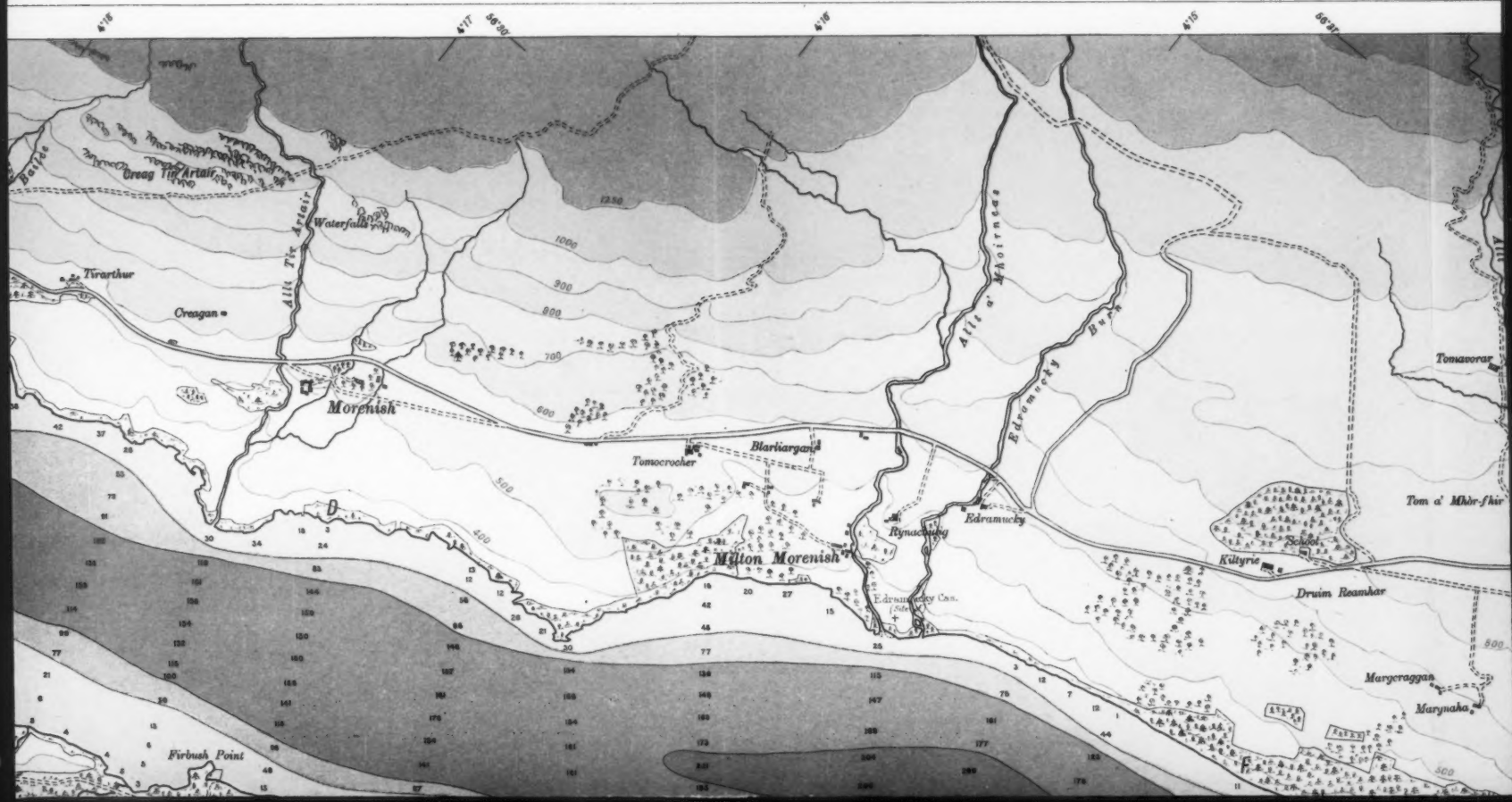
PLATE II


56·28
4·18
R. LOCHAY
Finlarig
Finlarig Castle (Ruins)
Gallows Tree
Mausoleum
Drum na Lairige
Allt na Beirige
Loch Tay Station
CALLANDER AND OBAN RAILWAY
Killin Branch
Killin Pier
Manse
Liable to Floods
Inn
Killin
Station
Lyon Cottages
R. DOCHART
Viaduct
Kinnell
Stone Circle
Boat Houses
Achmore Burn
Liable to Floods
Lodge
Achmore Wood
Achmore
300

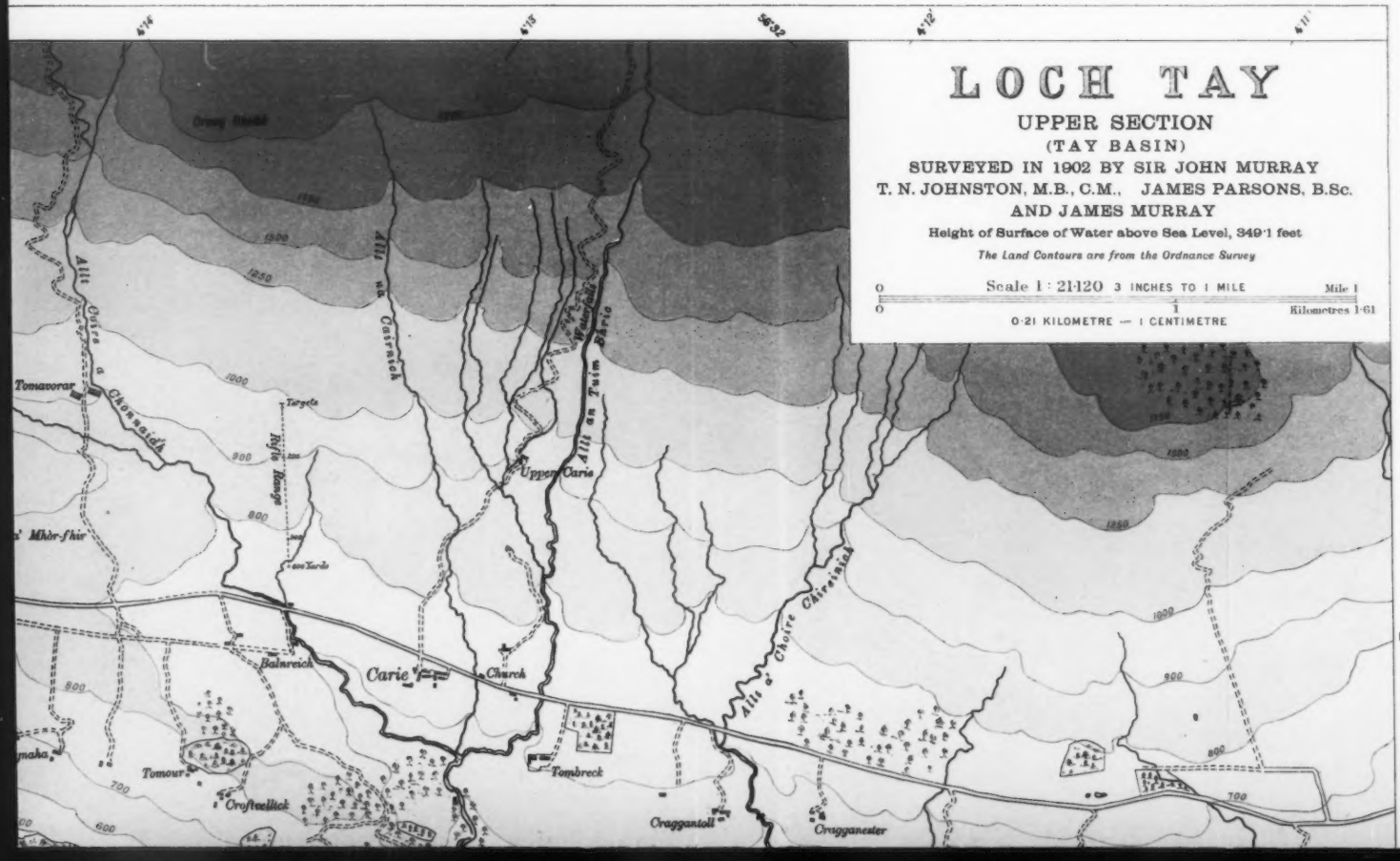
BATHYMETRICAL SURVEY OF THE FRESH-WATER LOCHS OF SC

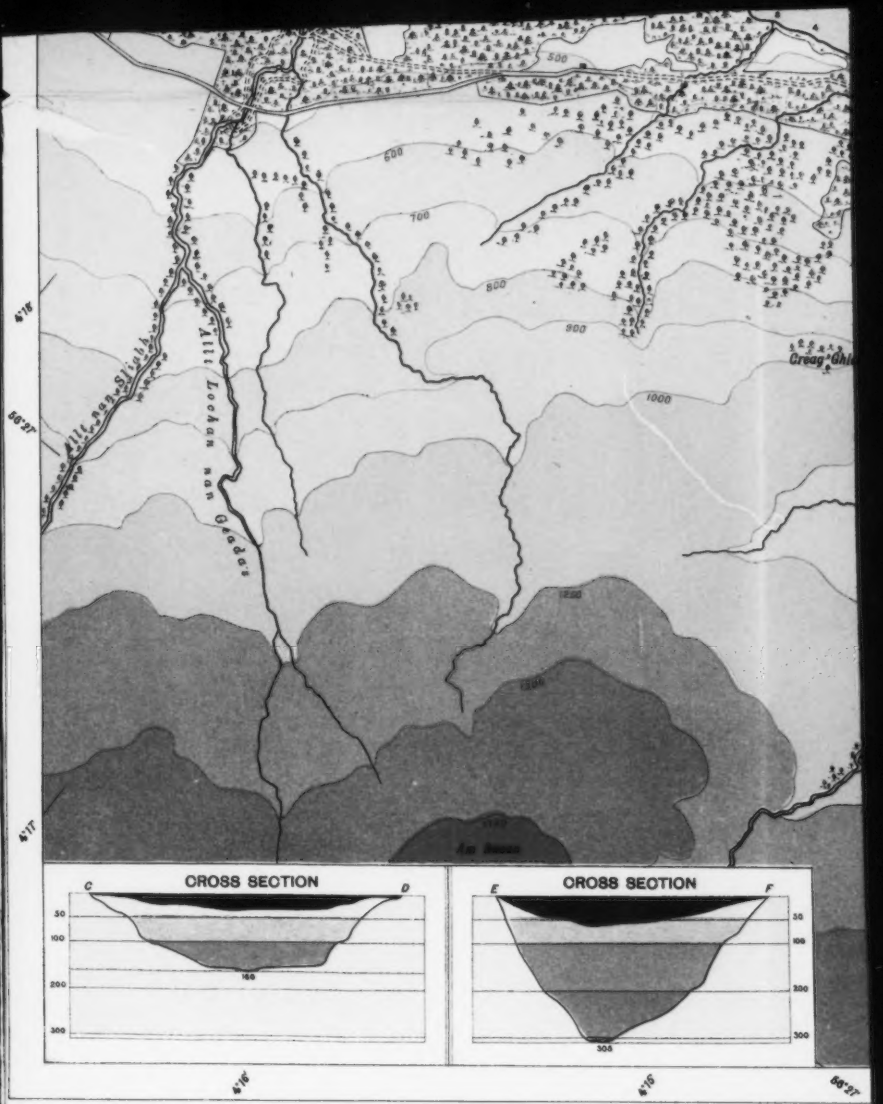
UNDER THE DIRECTION OF

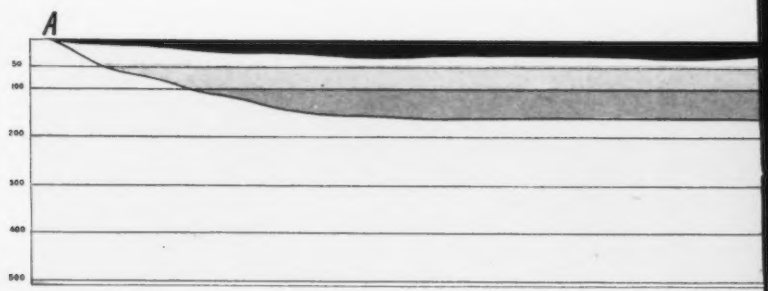
SIR JOHN MURRAY, K.C.B., F.R.S., D.Sc., AND LAURENCE PULLAR, F.R.S.E.



SCOTLAND


4°16'
4°15'
56°32
4°12'
4°11'
LOCH TAY
UPPER SECTION
(TAY BASIN)
SURVEYED IN 1902 BY SIR JOHN MURRAY
T. N. JOHNSTON, M.B., C.M., JAMES PARSONS, B.Sc.
AND JAMES MURRAY
Height of Surface of Water above Sea Level, 349·1 feet
The Land Contours are from the Ordnance Survey
Scale 1 : 21120 3 INCHES TO 1 MILE
Mile 1
Kilometres 1·61
0·21 KILOMETRE — 1 CENTIMETRE
Allt Coire a' Chonaidh
Allt na Caiteach
Allt an Tuim Bhric
Tomavorar
Targyle
Upper Carie
Mhòr-fhir
Balnreich
Carie
Church
Allt a' Choire Chiresaich
Tombreck
Tomour
Croftcelltich
Craggantoll
Cragganeter
HEIGHTS IN FEET
FEET
METRES
2000 609·6
1750 533·4
1500 457·2
1250 381·1
1000 304·8
900 274·3
800 243·8





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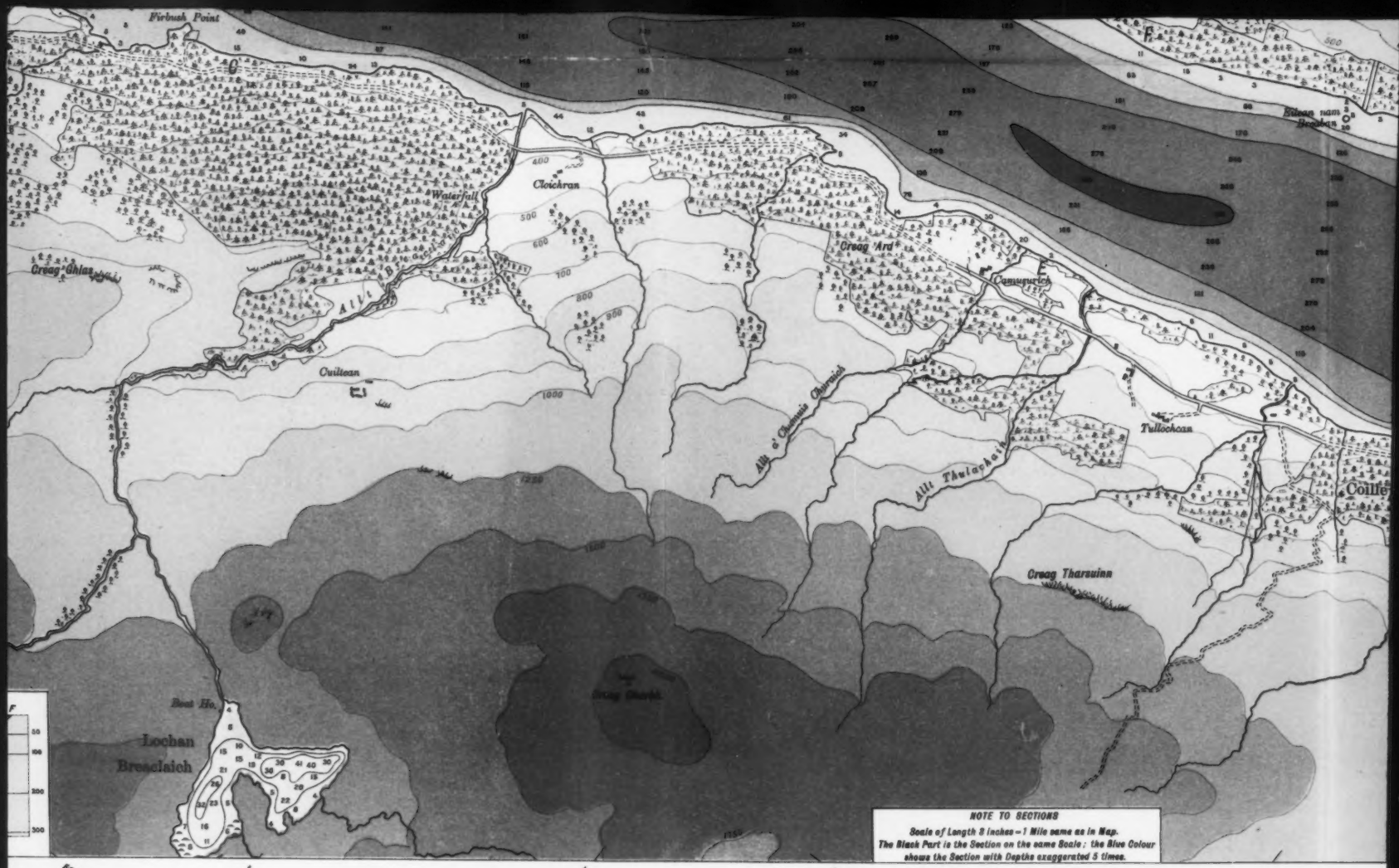
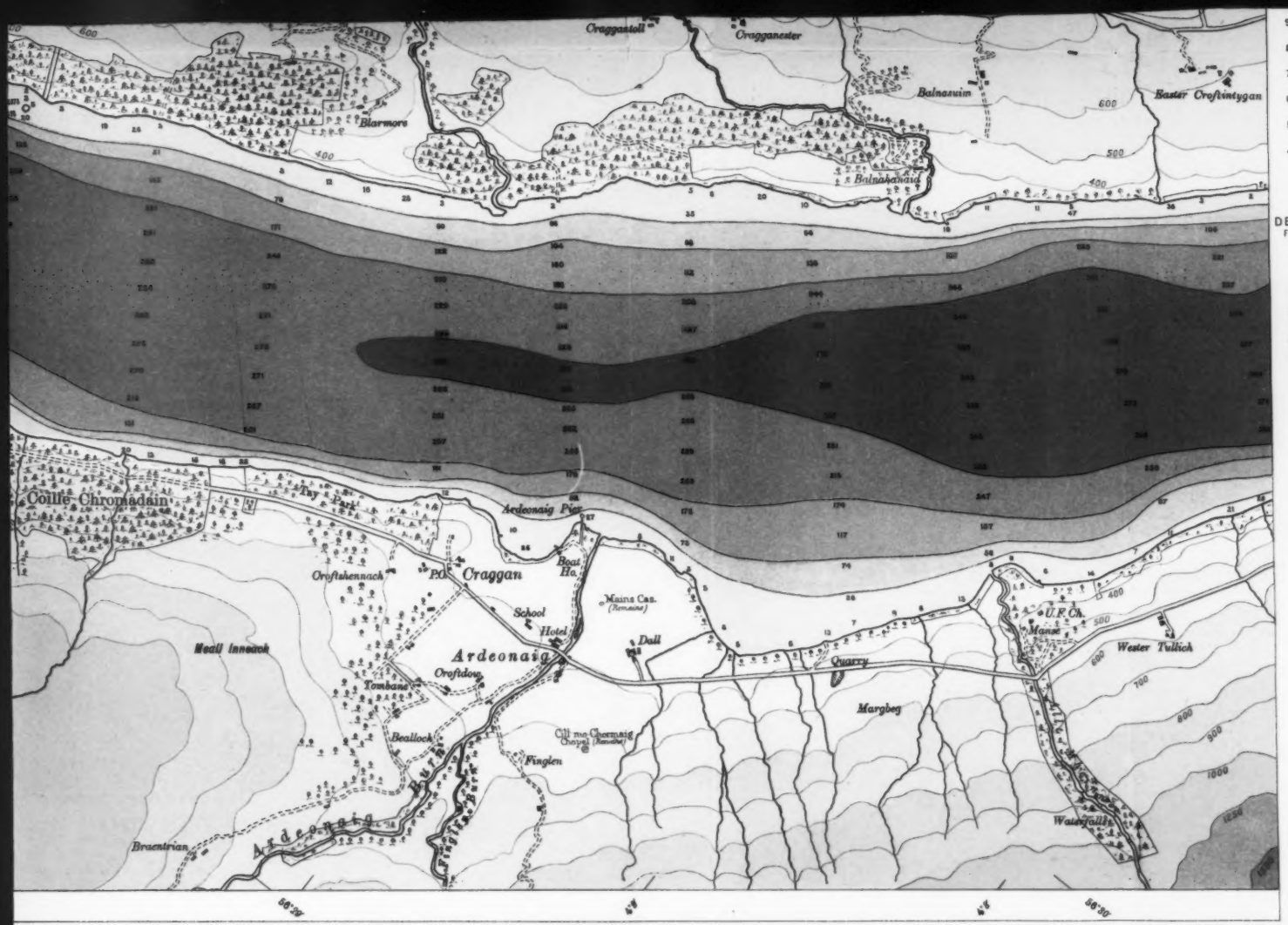


LONGITUDINAL SECTION ALONG AXIS OF MAXIMUM DEPTH

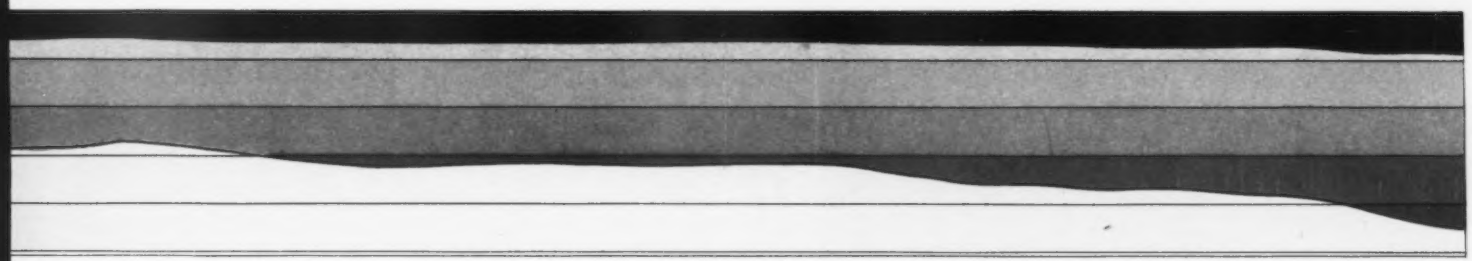
Published by the Royal Geographical Society.



900	274·3
800	243·8
700	213·4
600	182·9
500	152·4
400	121·9

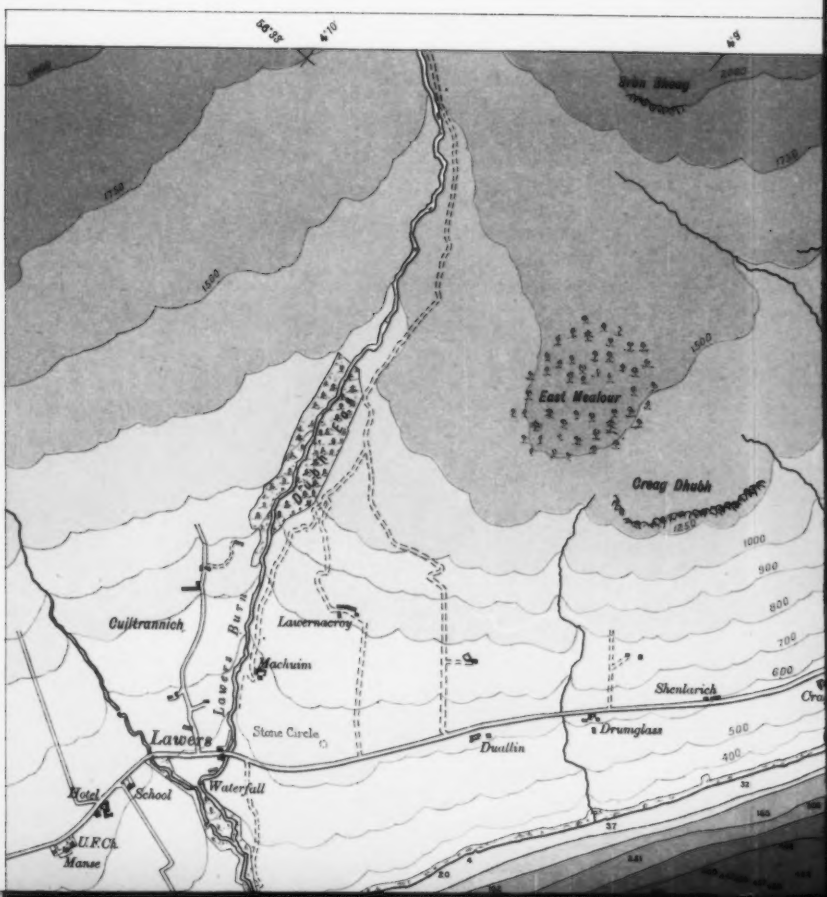
DEPTHS IN FEET

FEET	METRES
50	15·2
100	30·5
200	61
300	91·4



J. G. Bartholomew

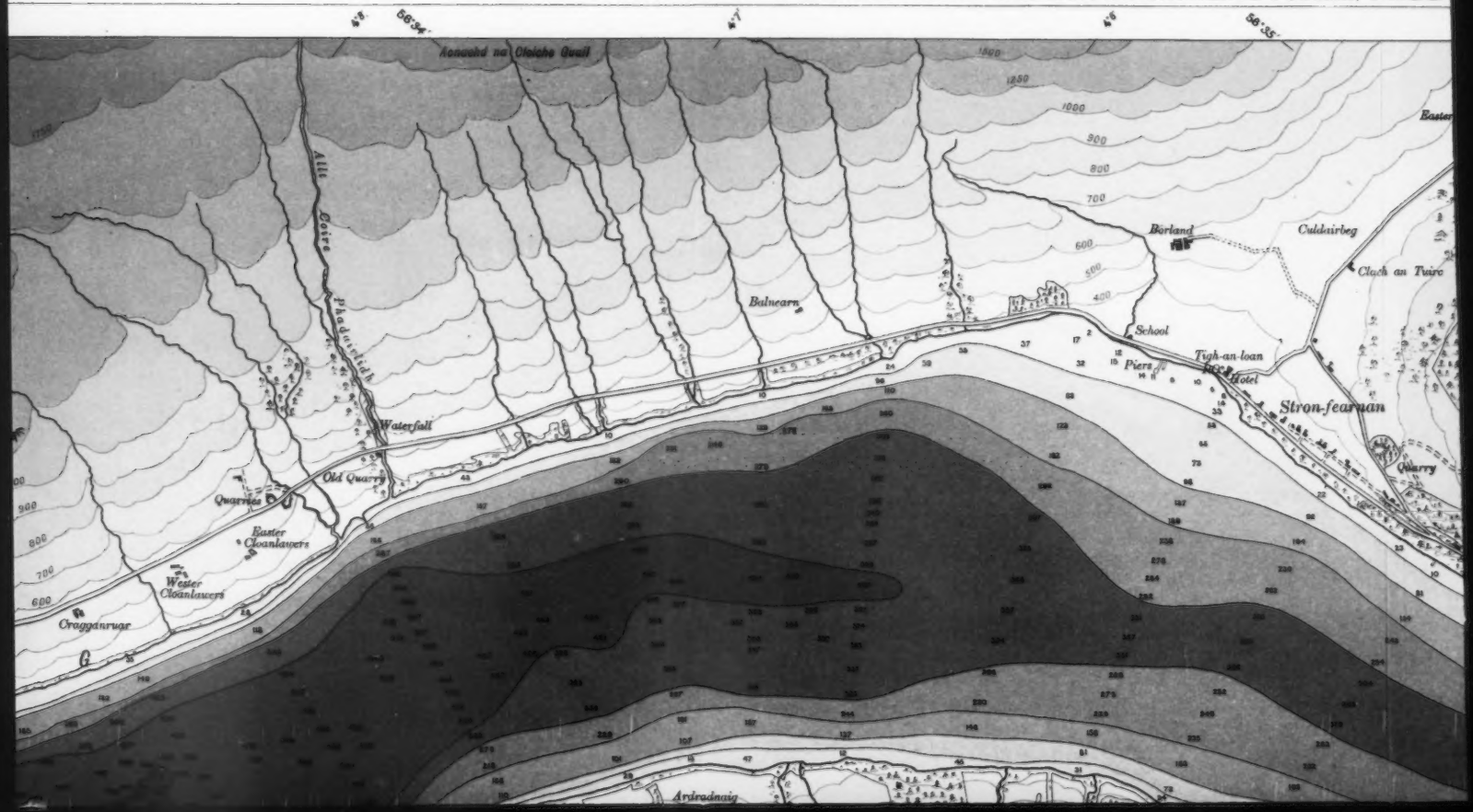
PLATE III


56°25'
4°10'
4°5'
Ben Heasgarnich
East Meaiour
Creag Dhubh
Cuiltrannich
Lawers Burn
Lawers
Stone Circle
Waterfall
Hotel
School
U.F.C.
Manse
Drumglass
Shenlarich
1000
900
800
700
600
500
400

BATHYMETRICAL SURVEY OF THE FRESH-WATER LOCHS

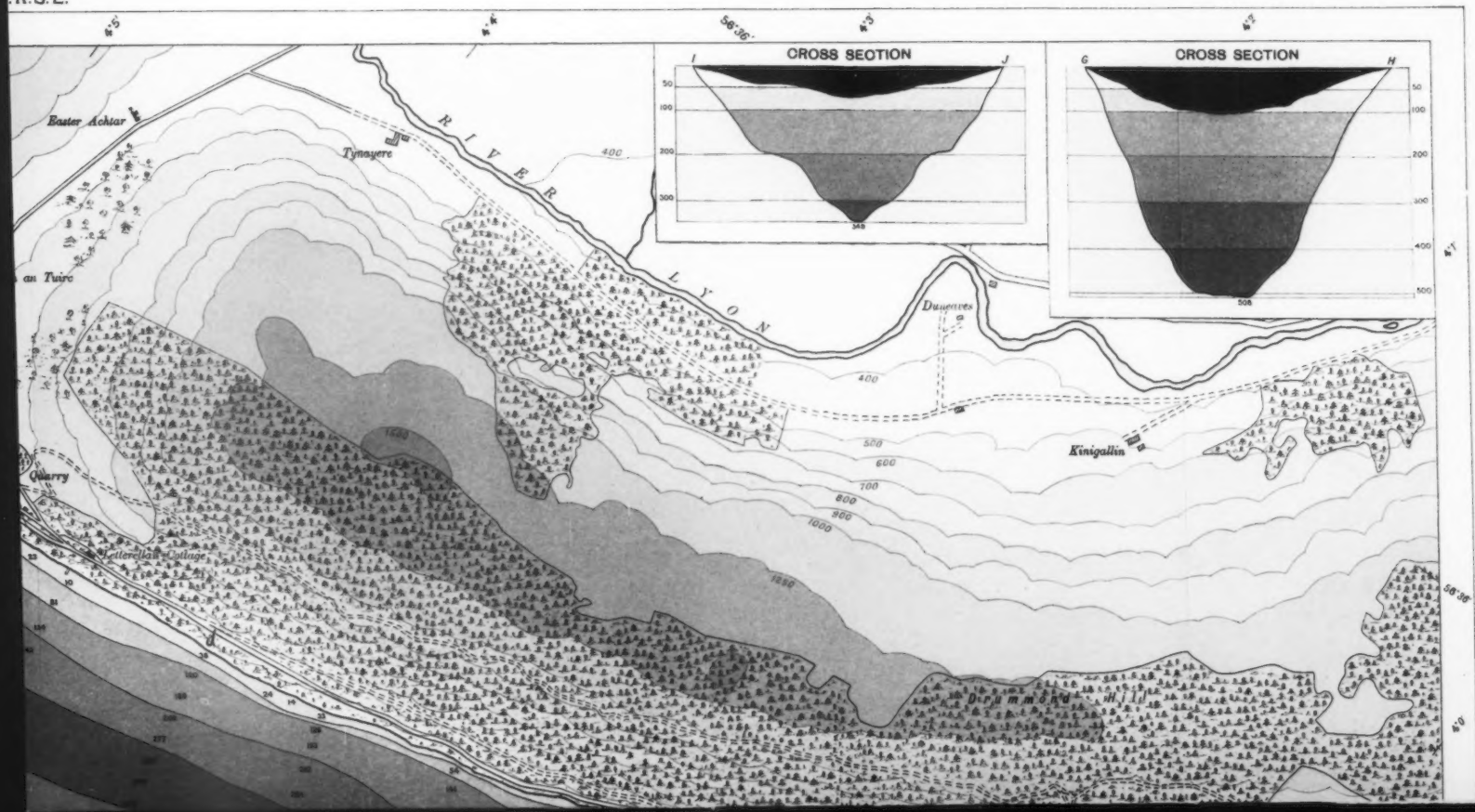
UNDER THE DIRECTION OF

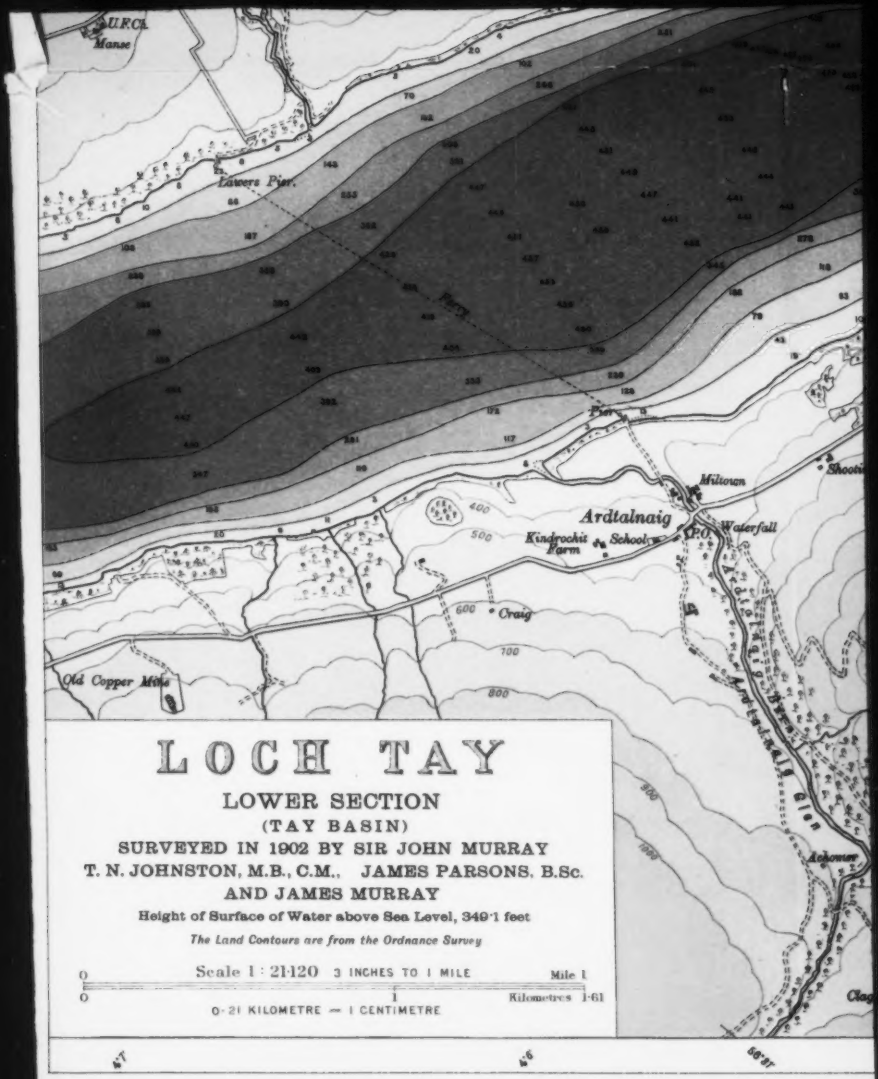
SIR JOHN MURRAY, K.C.B., F.R.S., D.Sc., AND LAURENCE PULLAR, F.R.S.E.



CHS OF SCOTLAND

.R.S.E.





LOCH TAY

LOWER SECTION

(TAY BASIN)

SURVEYED IN 1902 BY SIR JOHN MURRAY
T. N. JOHNSTON, M.B., C.M., JAMES PARSONS, B.Sc.
AND JAMES MURRAY

Height of Surface of Water above Sea Level, 349·1 feet

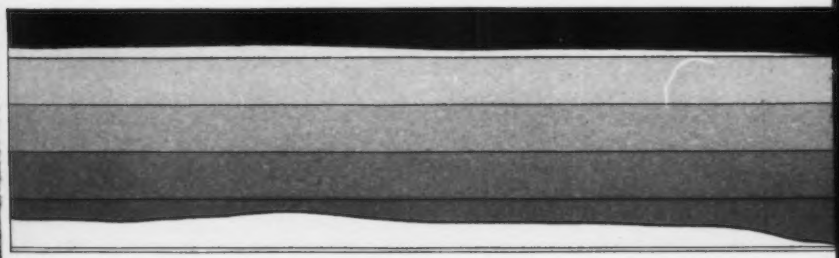
The Land Contours are from the Ordnance Survey

Scale 1 : 21120 3 INCHES TO 1 MILE

0 Mile 1

0 1 Kilometres 1·61

0·21 KILOMETRE = 1 CENTIMETRE



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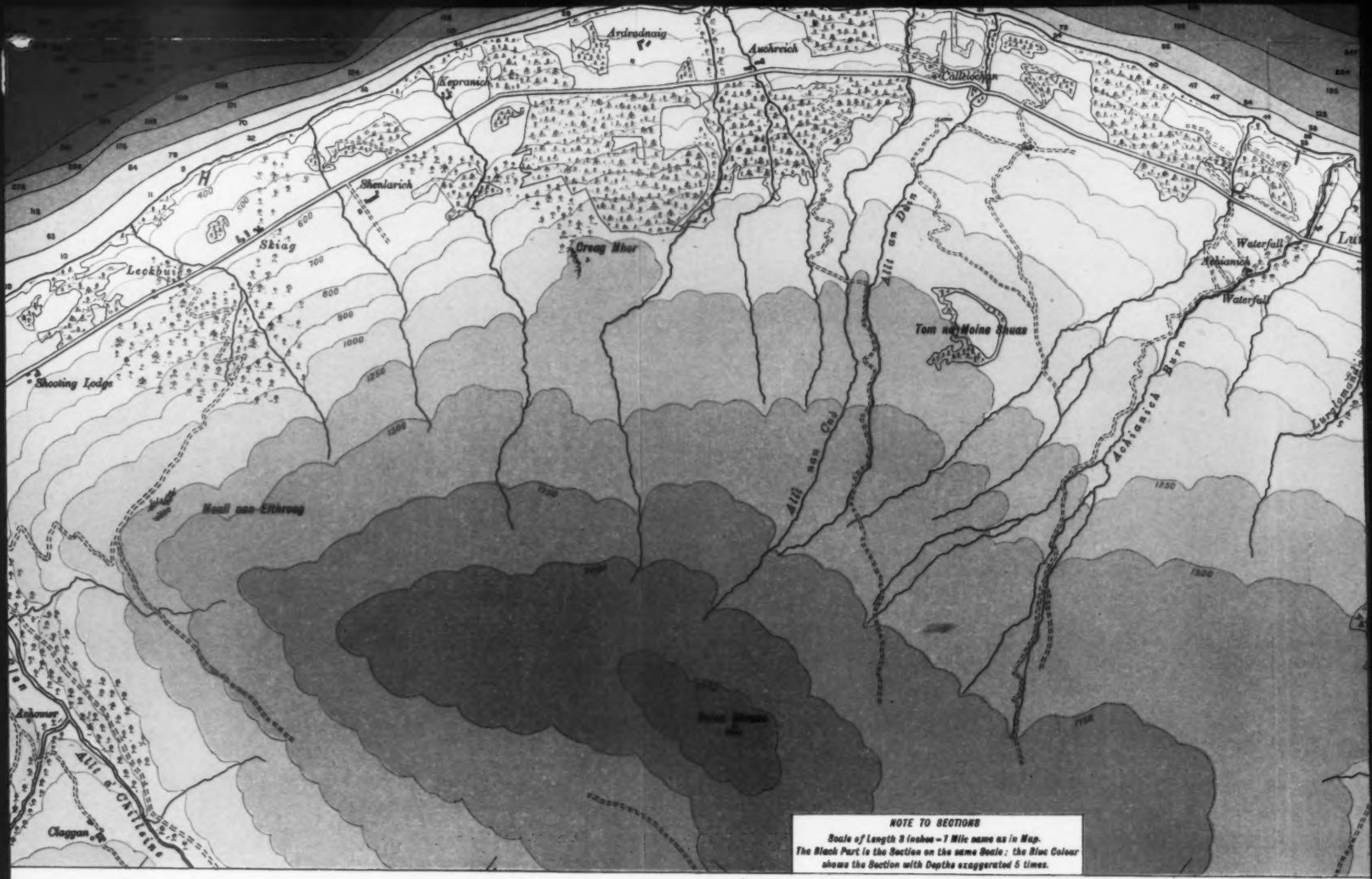
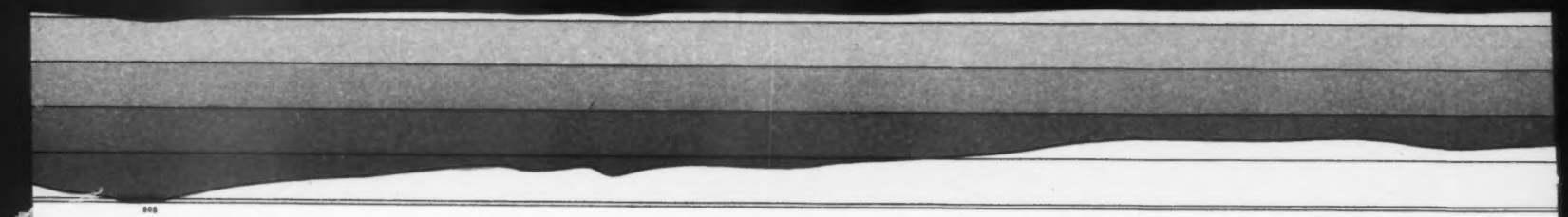
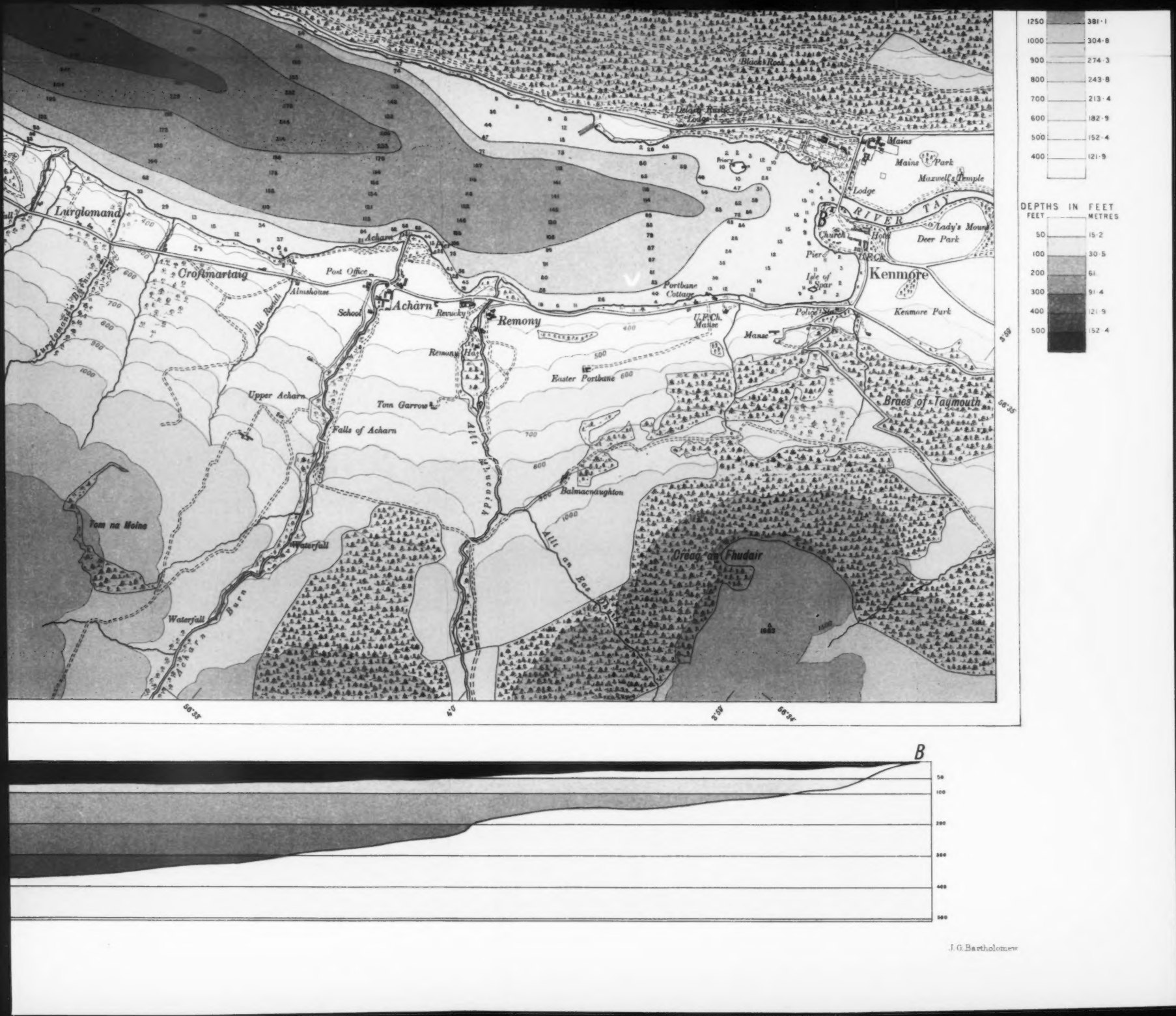
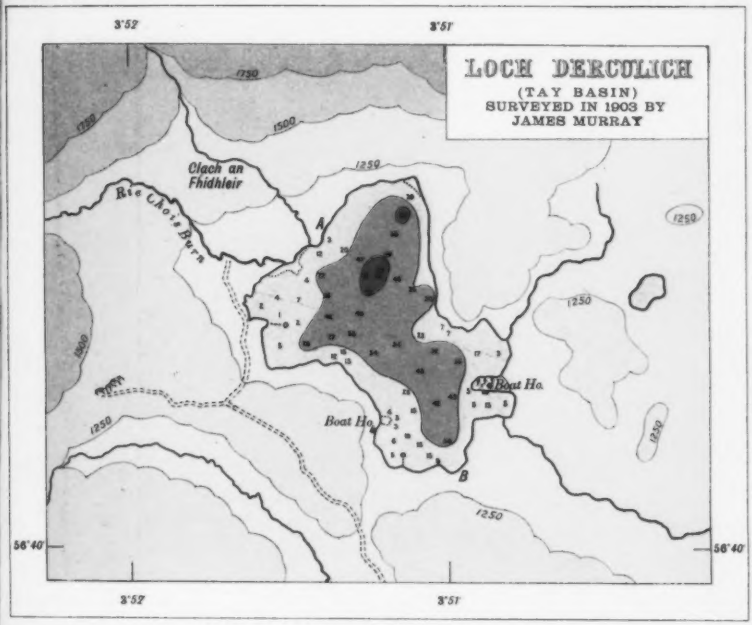


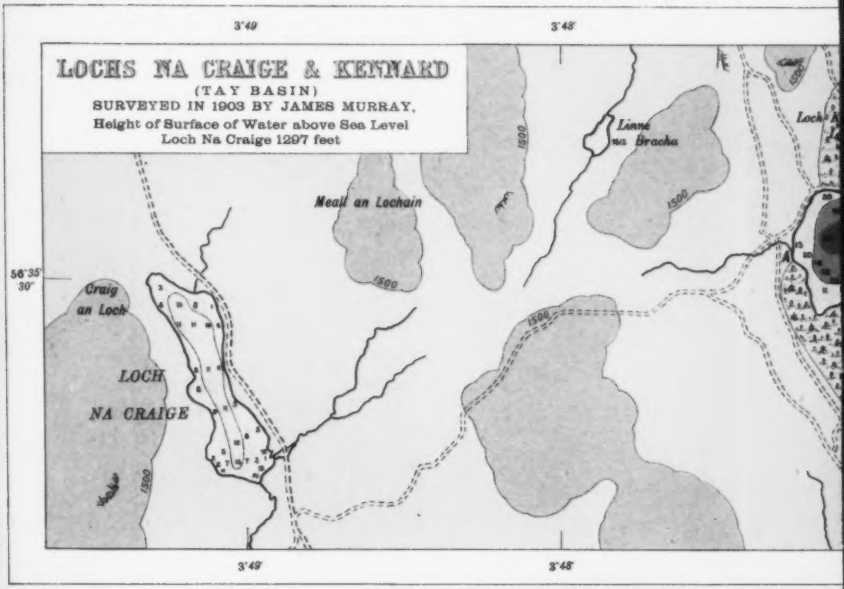
LONGITUDINAL SECTION ALONG AXIS OF MAXIMUM DEPTH



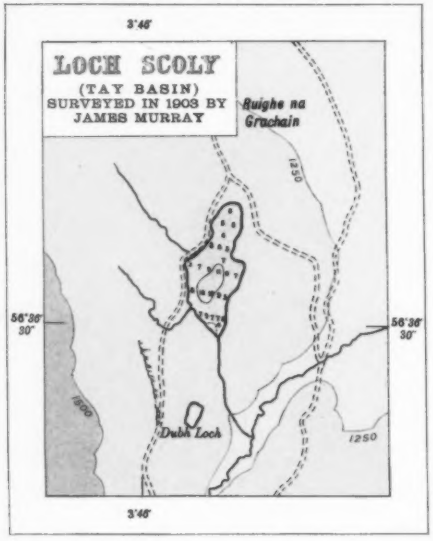
Published by the Royal Geographical Society.

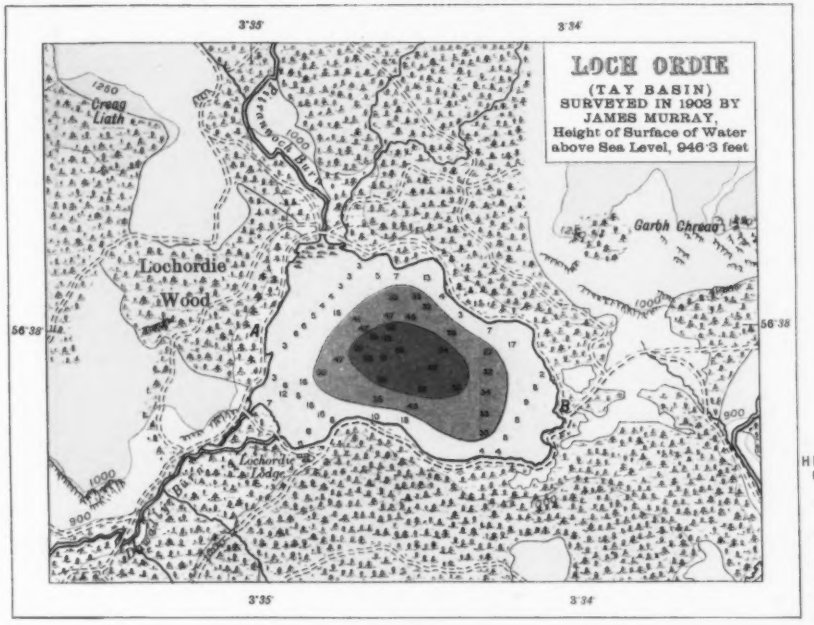

Lurgiomand
Crofimartaig
Acharn
Remony
Kenmore
Braes of Taymouth
Falls of Acharn
Upper Acharn
Tom na Moine
Balmacnaughton
Creag an Fhudair
Waterfall
Waterfall Burn
Allt Bodil
Allt Mhoraidh
Allt an Eas Dubh
Post Office
Almshouse
School
Revucky
Remony House
Easter Portbane
Portbane Cottage
U.P.Ch. Manse
Manse
Police Station
Black Rock
Dalcraft Rock Lodge
Mains
Mains Park
Maxwell's Temple
Lodge
Church
Hotel
Pier
T.P.Ch.
Isle of Spar
Lady's Mound
Deer Park
Kenmore Park
RIVER TAY
B
B
1250 381·1
1000 304·8
900 274·3
800 243·8
700 213·4
600 182·9
500 152·4
400 121·9
DEPTHS IN FEET
FEET METRES
50 15·2
100 30·5
200 61
300 91·4
400 121·9
500 152·4
50
100
200
300
400
500
56°35'
4°
3°59'
56°34'
J. G. Bartholomew





The Edinburgh Geographical Institute

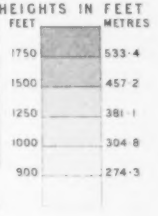


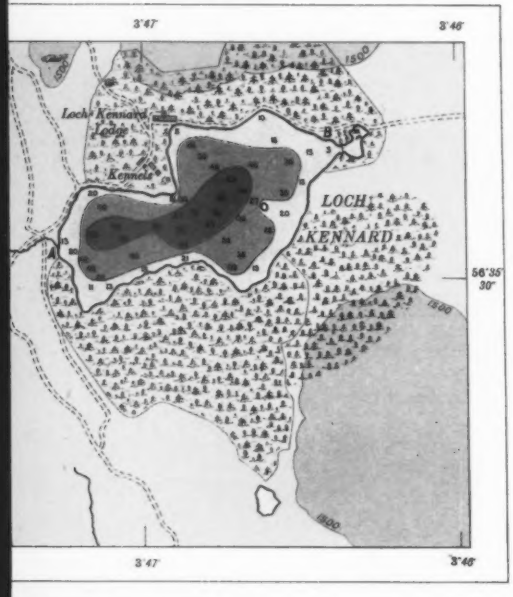


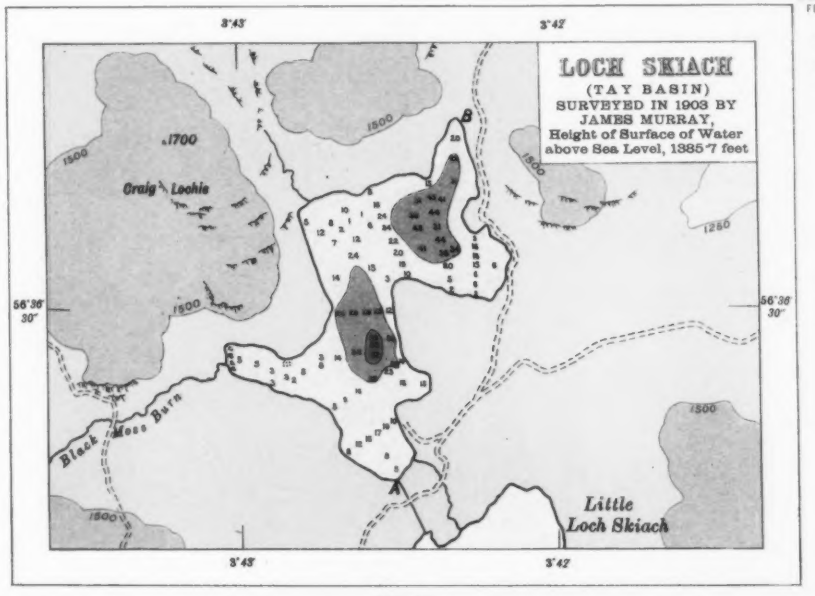
Scale 1: 21120 3 INCHES TO 1 MILE
0·21 KILOMETRE — 1 CENTIMETRE
Mile 1
Kilometres 1·61

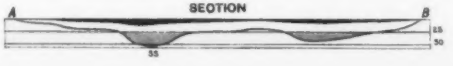
NOTE TO SECTIONS
Scale of Length 3 inches = 1 Mile same as in Map.
The Black Part is the Section on the same Scale; the Blue Colour shows the Section with Depths exaggerated 5 times.

The Land Contours are from the Ordnance Survey



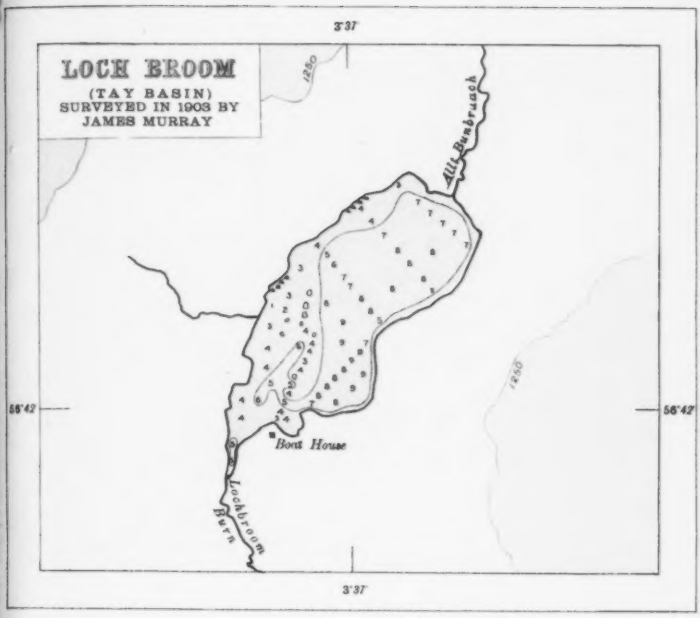


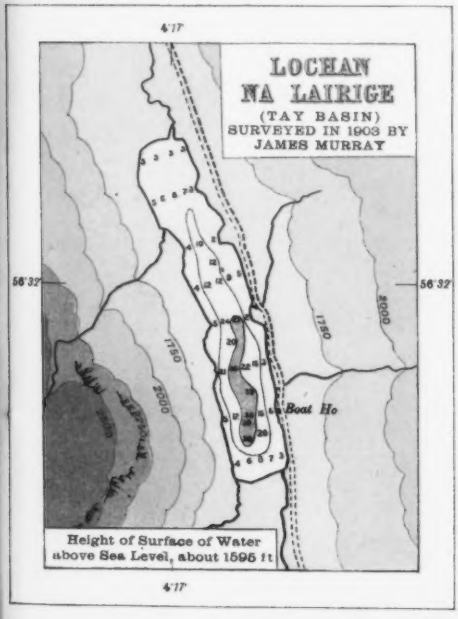


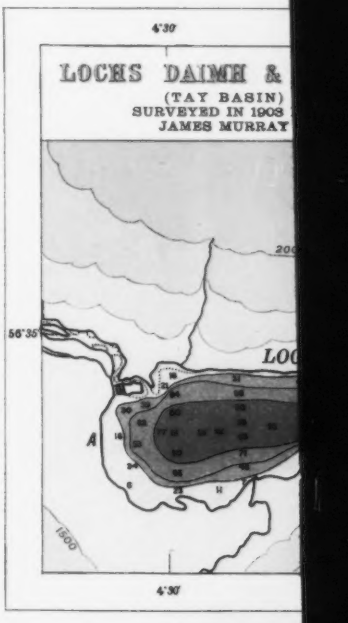


J. G. Bartholomew

PLATE V





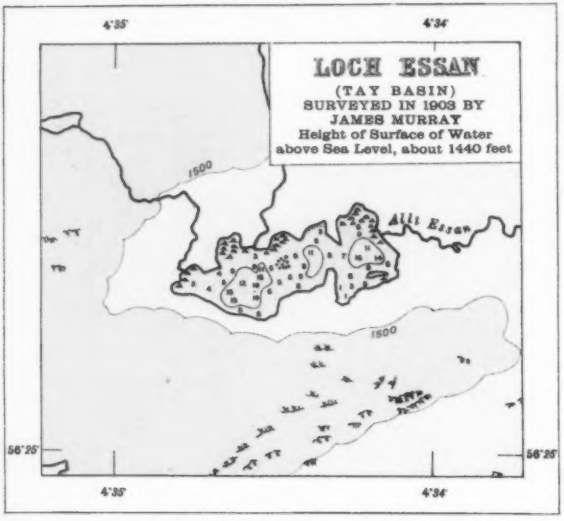


The Edinburgh Geographical Institute

TRICAL SURVEY OF THE FRESH-WATER LOCHS OF SCOTLAND

UNDER THE DIRECTION OF

SIR JOHN MURRAY, K.C.B., F.R.S., D.Sc., AND LAURENCE PULLAR, F.R.S.E.



Scale 1: 21120 3 INCHES TO 1 MILE Mile 1

0·21 KILOMETRE — 1 CENTIMETRE Kilometres 1·61

NOTE TO SECTIONS

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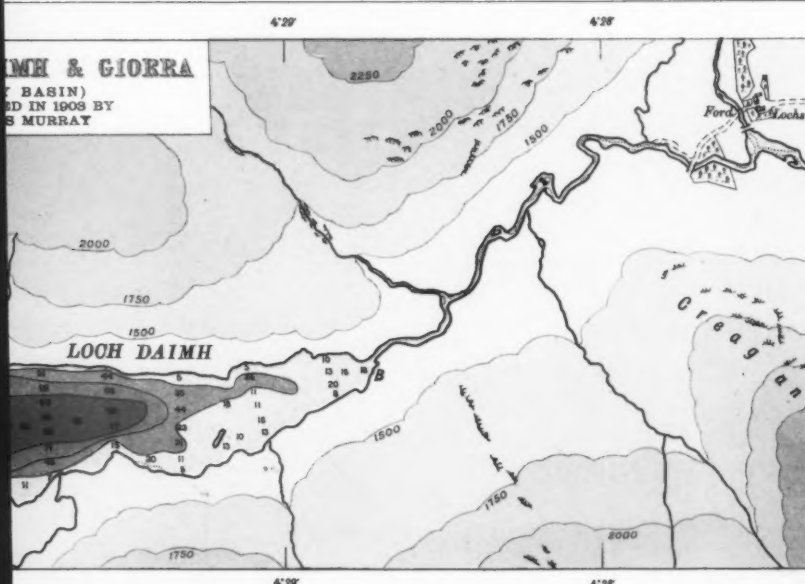
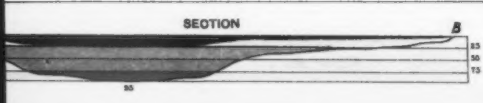
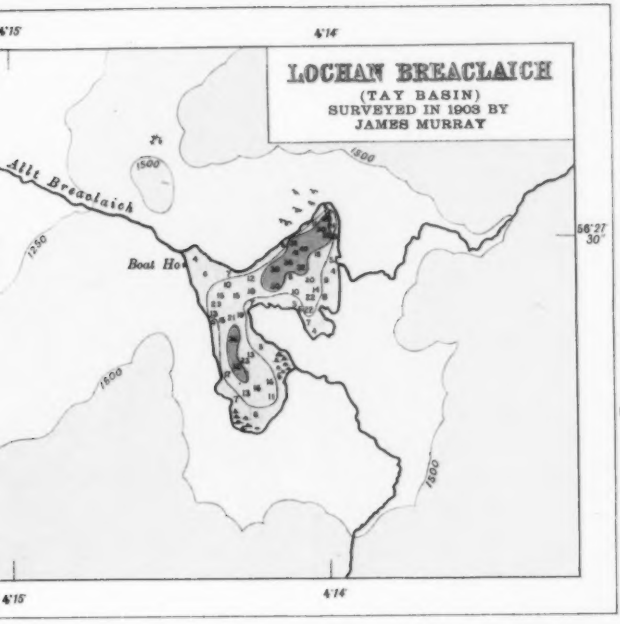


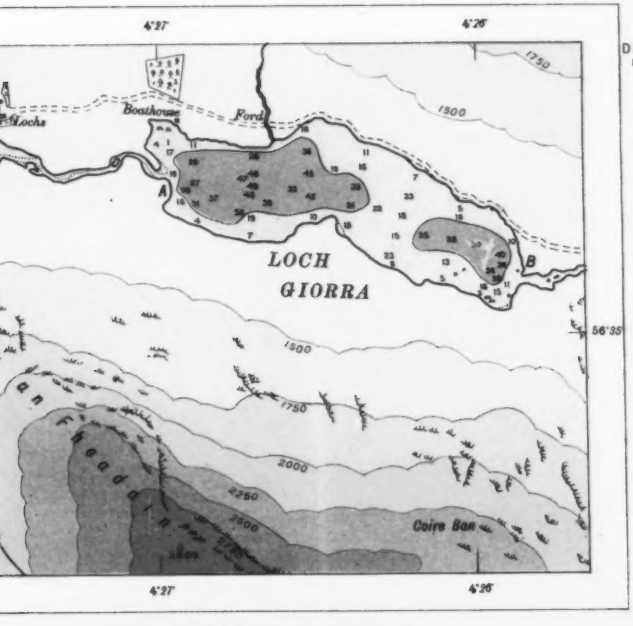




HEIGHTS IN FEET

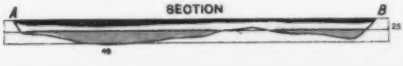
FEET	METRES
2750	838·2
2500	762
2250	685·8
2000	609·6
1750	533·4
1500	457·2
1250	381·1

The Land Contours are from the Ordnance Survey



DEPTHS IN FEET

FEET	METRES
25	7·6
50	15·2
75	22·9



J. G. Bartholomew

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